IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF ALABAMA
EASTERN DIVISION

BRIAN BONNER,	)	
	)	
Plaintiff,	)	
	)	
vs.	)	CASE NO. 3:06-cv-00715-MHT
	)	
INTERSTATE ARMS CORP., et al.,	)	
	)	
Defendants.	)	

PLAINTIFF'S EVIDENTIARY SUBMISSIONS IN OPPOSITION TO TWO DEFENDANTS' MOTIONS FOR SUMMARY JUDGMENT

Comes now Brian Bonner and offers into the record of the above-styled matter the attached evidentiary materials. In addition to all other materials in the record, plaintiff relies on the attached items in opposing the motions for summary judgment separately filed by China North Industries Corporation ("Norinco") and Qiqihar Hawk Industries Co., Ltd. Attached are affidavits executed by John T. Butters and Raymond Thompson.

Plaintiff is separately filing memorandum briefs explaining his opposition to Norinco's request for a summary judgment and his opposition to Qiqihar Hawk's joinder in Norinco's summary-judgment motion and assertions of additional grounds.

Respectfully submitted,

s/ David J. Hodge
Of Counsel for Plaintiff
Bar Number: ASB -4617-I71H
Pittman Dutton Kirby & Hellums, P.C.
2001 Park Place North
1100 Park Place Tower
Birmingham, Alabama 35203
(205) 322-8880
(205) 328-2711 facsimile
Email: PHDKH-efiling@pittmanhooks.com

CERTIFICATE OF SERVICE

I hereby certify that on **6th** day of **March**, **2008**, I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system which will send notification of such filing to the following:

Todd M. Higey, Esq.
RICHARDSON CLEMENT, P.C.
200 Cahaba Park Circle, Suite 125
Birmingham, AL 35242
Attorney for Interstate Arms and Qiqihar Hawk

James C. Barton, Jr., Esq.
Alan D. Mathis, Esq.
JOHNSTON, BARTON, PROCTOR & POWELL, LLP
2900 Regions/Harbert Plaza
1901 6th Avenue North
Birmingham, AL 35203
Attorney for Norinco

s/ David J. Hodge
Of Counsel for Plaintiff

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE MIDDLE DISTRICT OF ALABAMA, EASTERN DIVISION,

B. B. a minor, by and through his mother and next friend, OWENA KNOWLES,	)
Plaintiff,	)
v.	)Civil Action No.: 3:06cv715-MHT
NORINCO a/k/a CHINA NORTH INDUSTRIES CORPORATION, QIQIHAR HAWK INDUSTRIES, et al.,	)
Defendants.	)

AFFIDAVIT OF JOHN T. BUTTERS

STATE OF TEXAS)
)
COUNTY OF Kerr)

Before me, the undersigned notary public in said county and state, personally appeared John T. Butters and upon being duly sworn, deposes and says as follows:

1. My name is John T. Butters. I am over the age of nineteen (19) years and reside in Texas.

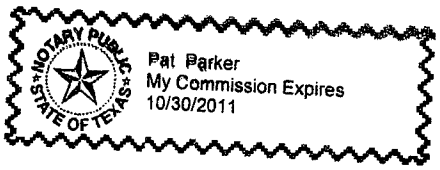
2. I have reviewed and inspected the firearm in this case. Based on my inspection of the firearm and my experience with firearms and my background in engineering, I have formed several opinions regarding the defect of the shotgun at issue in this litigation.

3. Attached to this affidavit is a correct and accurate copy of my report outlining my opinions and investigation regarding the shotgun at issue in this litigation.

JOHN T. BUTTERS

Sworn to and subscribed before me this 3rd day of March, 2008.

Pat Parker
NOTARY PUBLIC



My Commission Expires:

10-30-2011

Engineering Consultants Inc.

158 Cook Lane
Center Point, Texas 78010

Phone 830-634 7250
Fax 830-634 7240 E-Mail

Mr. David Hodge
Pittman, Hooks, Dutton, Kirby and Hellums PC
Attorneys at Law
1100 Park Place Tower
Birmingham, Alabama 35203

20 November 2005

Re: Brian Bonner Firearms Injury Accident
Norinco Model 98 12 Gage Shotgun
Case No. 40702
ECI File No. 8564

Dear Mr. Hodge:

It is reported that Mr. Brian Bonner attempted to fire his Norinco Model 98 12 gage 18 inch barrel shotgun, serial number 0016971, by pulling the trigger with its chamber loaded and its safety on "Fire". As he did so, he heard a distinct click but the gun did not fire. When he noticed that the barrel was loose and slipping forward, Mr. Bonner caught the barrel to prevent it falling off and pulled it back into the action whereupon the gun discharged and severely injured his hand.

Upon examination of the subject shotgun it was found that the barrel stud intended to retain the barrel in its proper location in the assembled gun had failed through its soldered joint on the barrel. Examination under magnification revealed that the separated solder joint had failed due to inadequate solder flow and adherence in the interface between the stud and the barrel. Numerous voids and flow faults were evident indicative of improper parts cleaning and fluxing techniques. The attachment of the stud to the barrel was thereby weakened and compromised the integrity of assembly of a nearly new shotgun which showed no signs of abuse, misuse or modification.

The barrel extension locking recess and bolt locking block showed no sign of damage or deterioration other than very minor normal wear. Firing of the gun prior to the accident is therefore judged to have been normal and with the bolt properly locked.

The Winchester-Western "Low Brass" #7 1/2 Factory shot shell fired at the time of the accident was normal in appearance with a moderately flattened battery cup primer and no damage to its plastic case walls or case head reinforce. The shell may therefore be seen to have been fully supported by the barrel chamber and bolt face at the time of firing and to have been subjected to no catastrophic stress or excessive pressure.

The design of the Norinco Model 98 pump shotgun is copied in detail from the Remington Model 870 pump shotgun and employs all of the operating features and mechanical interlocks of the original Remington. Among these features are a spring loaded inertial firing pin and a firing pin block implemented by the bolt locking block that requires that the bolt locking block be fully inserted in its locking recess in the barrel extension before the firing pin will protrude sufficiently to contact the primer of a chambered shell. The spring loaded inertial firing pin is shorter than the channel in the bolt in which it operates so an energetic blow on the head of the firing pin, normally delivered by the impact of the hammer when the trigger is pulled, is required

to drive the firing pin forward against the force provided by its partially compressed retraction spring so as to cause the firing pin to protrude beyond the face of the bolt.

Examination of the shotgun fire control assembly showed it to be clean and lightly lubricated with sharp square hammer hook and sear engagements of adequate angle and depth. There were no signs of damage, unusual or disabling wear or post manufacture modification, misuse or abuse. All springs were in place, of proper configuration and functioning correctly.

An inert shot shell was prepared with a live primer and loose paper wad but no propellant charge, wad or shot and was inserted in the subject shotgun chamber with the shotgun uncocked and its safety on "Fire". With the hammer full forward in the uncocked or "fired" condition, the barrel was pulled forcibly to the rear to replicate the reported circumstances of the incident. When this was done, the chambered inert shell suffered no marking on the live primer. Since the condition of the subject shell indicates that it was fully chambered and supported by the bolt face at the time of discharge, it follows that at time of firing, the bolt locking block was fully inserted in the barrel extension locking recess and the firing pin blocking function consequently was not activated. Under the test conditions there was insufficient impact force applied to the fired hammer face resting against the firing pin head to cause the firing pin tip to protrude and indent the primer. It should also be noted that should the barrel be located too far forward to enable the bolt locking block to fully engage in the barrel extension locking recess, the ejector spring will escape to protrude behind the rear of the bolt and prevent the hammer face from contacting the head of the firing pin at all. It may therefore be shown that at the time of the discharge the shotgun bolt was locked "in battery" with the gun cocked, chamber loaded, its safety on "Fire" and the bolt locking block fully engaged in the barrel extension locking recess. Under these conditions the inert test shot shell experienced a sufficiently indented primer to cause it to "fire" when a 3 1/2 pound pull was applied to the trigger.

It is my opinion that the distinct click heard by Mr. Bonner just prior to the accident was caused either by the breakage of the faulty barrel stud solder joint or by the loose stud and ring sliding on the magazine tube. It is my opinion that the firearm discharged during Mr. Bonner's attempt to prevent the barrel from falling off due to an inadvertent trigger pull occasioned by the barrel suddenly and unexpectedly breaking off the gun.

The barrel broke off the shotgun due to a manufacturing defect. That defect was a faulty solder joint holding the barrel retaining stud and ring in place.

It is my opinion that the defective barrel retention means on the subject shotgun rendered it unfit for its originally intended design and purpose and created a concealed and unreasonably dangerous condition which would not be anticipated by a user of the gun who was using it in a normal and foreseeable way and that this defect caused the injury of Mr. Brian Bonner.

If I may be of further service please contact me.

Very truly yours

John T. Butters PE

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE MIDDLE DISTRICT OF ALABAMA, EASTERN DIVISION,

B. B. a minor, by and through his mother and next friend, OWENA KNOWLES,	)
Plaintiff,	)
v.	)Civil Action No.: 3:06cv715-MHT
NORINCO a/k/a CHINA NORTH INDUSTRIES CORPORATION, QIQIHAR HAWK INDUSTRIES, et al.,	)
Defendants.	)

AFFIDAVIT OF RAYMOND G. THOMPSON

STATE OF ALABAMA)
)
COUNTY OF Jefferson)

Before me, the undersigned notary public in said county and state, personally appeared Raymond G. Thompson and upon being duly sworn, deposes and says as follows:

1. My name is Raymond G. Thompson. I am over the age of nineteen (19) years and reside in Alabama.

2. I have reviewed and inspected the firearm in this case. Based on my inspection of the firearm and my background in engineering, I have formed several opinions regarding the defect of the shotgun at issue in this litigation.

3. Attached to this affidavit is a correct and accurate copy of my report outlining my opinions and investigation regarding the shotgun at issue in this litigation.

4. Also attached to this affidavit is a true and correct copy of my curriculum vitae.

RAYMOND G. THOMPSON

Sworn to and subscribed before me this 3rd day of March, 2008.

NOTARY PUBLIC

My Commission Expires:

10/10/10

VISTA ENGINEERING

Engineering simple solutions©

Hodge Shotgun Report – 18800

Prepared For:
David Jason Hodge
Pittman, Dutton, Kirby and Hellums, P.C.
1100 Park Place Tower
2001 Park Place North
Birmingham, AL 35203
(205) 322-8880

Prepared By:
Raymond Thompson, PhD, PE
Vista Engineering, Inc.
1500 1st Avenue North
Birmingham, AL 35203
205-307-6550

Items Examined

Items examined included:
Shot gun with the following markings:

- 12 ga 2 3/4 3”
- LHY scribed in various places
- 8-1
- I A C Billerica Ma
- LHY scribed on brazed part
- 0016971
- made in china
- Norinco 98

The braze joint between the gun barrel and the ring attaching it to the magazine tube was examined in detail.

Fig. 1 gun as received

Visual Analysis and Measurements

Measurements are shown in Appendix C.

Scanning Electron Microscope (SEM) Analysis

The brazed face of the part pictured in Fig. 2 was examined in the SEM.

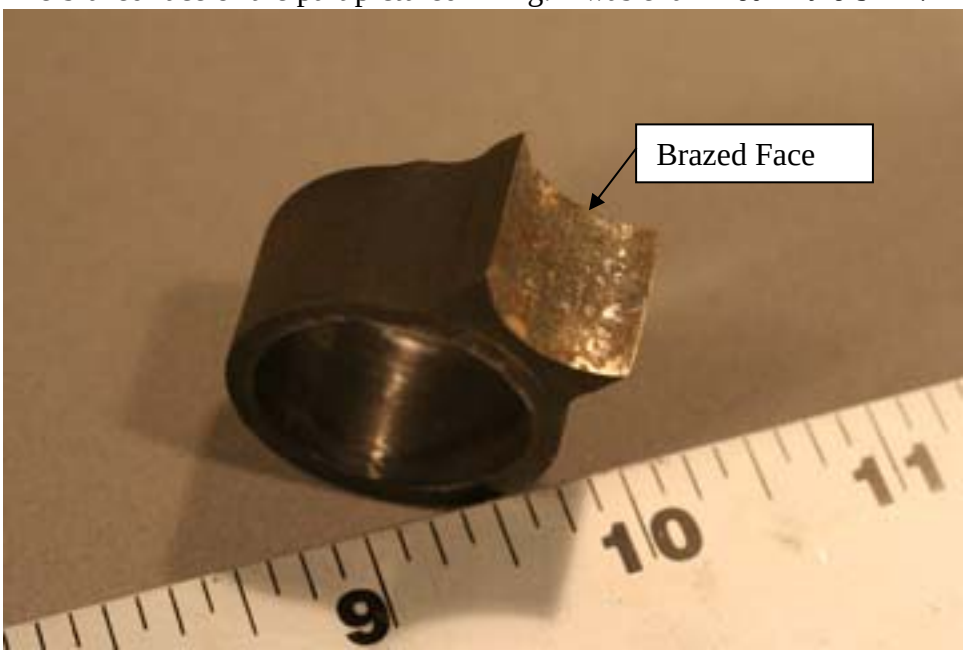


Fig. 2

The brazed face was found to be covered with;

- Braze pulled off of the opposite face (barrel side)
- Flux
- Bare steel
- Mixed steel and braze

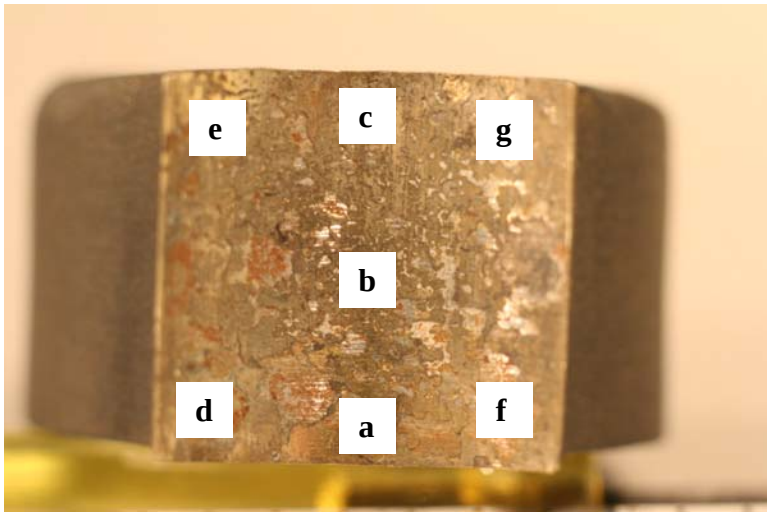


Fig. 3

The brazed surface was examined as shown in Fig. 3 and the pictures and chemistries can be found in Appendix A and B respectively. The picture and chemistry captions are labeled with the area shown on Fig. 3 so that picture **a1 25x** is found in Appendix A and is a picture of the region a at a magnification of 25x.

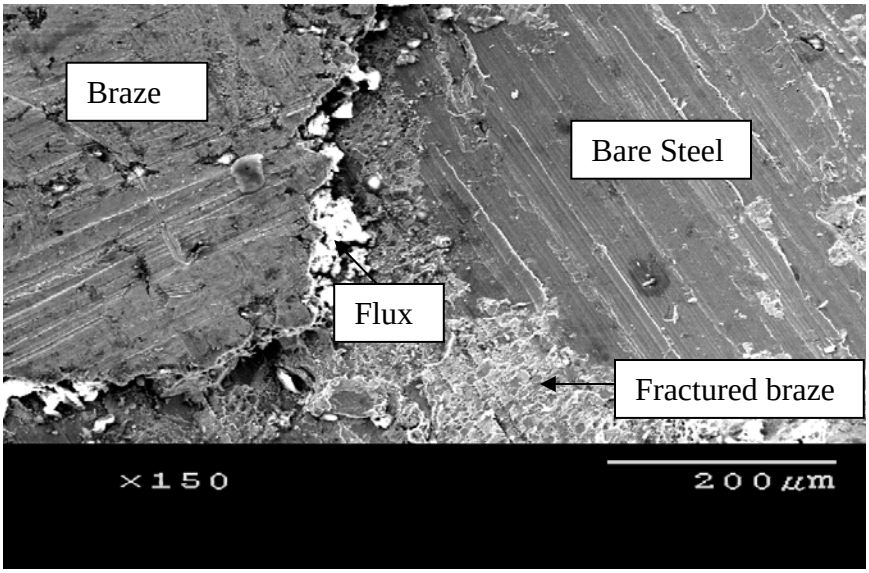


Fig. 4.

An example of the braze surface is shown in Fig. 4. The braze was found to be of a type like BAg27 which is a silver, copper, zinc, cadmium braze. However, exact identification is not possible without destructive testing.

The braze was found to be heavily populated with flux that was not removed from the joint during the brazing process. This is seen in Appendix A photos: b1, b2,b4,b5,c2,d1,e1,f1. The bright white area in each photo is concentrated in flux. This was confirmed by energy dispersive

x-ray chemical analysis of these spots. These chemical spectra can be found in Appendix B with similar caption numbers; b4, b5, d1, g1.

Appendix A photo **b3 particle** and Appendix B spectra **b3 particle** show what appears to be an unmelted flux particle.

Most of the braze surface is composed of braze metal that did not stick to the steel. Most of the poorly adhered braze in on the barrel side which means not enough heat was used to make a strong brazed joint. This is seen in Fig. xx where the raised braze in the photo has detached from the barrel side and the lower bare metal is where braze has detached from the ring side.

Only small areas of broken braze where found. Fig. xx is an example of braze that has a ductile rupture. This type of surface on the braze was only found in a small area of two of the 7 areas examined in the SEM. Of the area examined, a braze surface of this type was less than 5%.

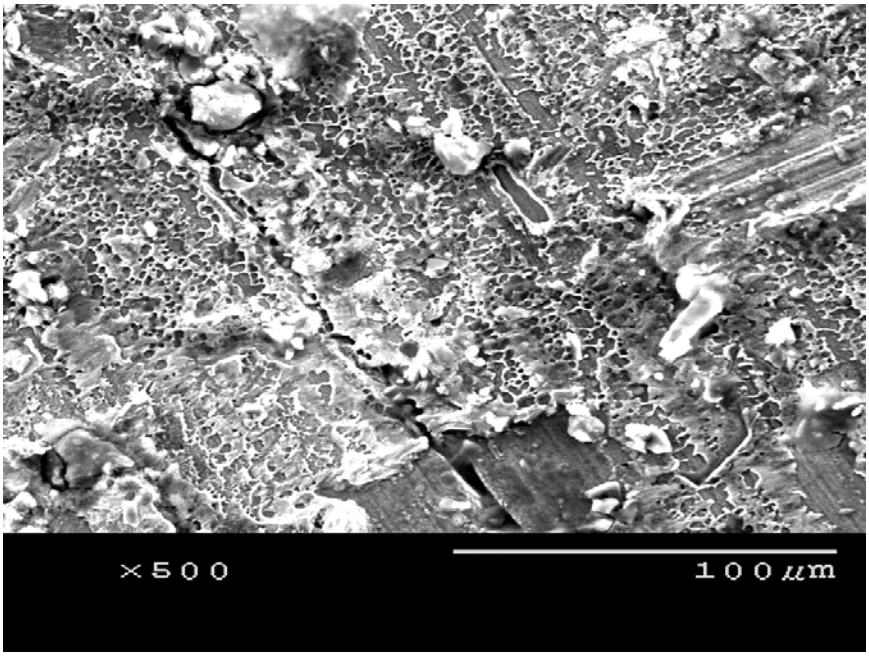


Fig. 5 area a2.

Analysis

The brazed joint was poorly made and defective for that reason. The braze did not adhere to either the ring or the barrel. The lack of strength of this braze joint is the cause of the separation of the barrel from the magazine. The cause of this poor manufactured braze joint is most likely poor heating of the joint during brazing. The joint has entrapped flux which shows that not enough capillary force was developed to remove it during brazing. Poor fluxing would also contribute to the lack of adhesion between the braze and the steel. Fig. 6 and 7 show large areas of trapped flux.

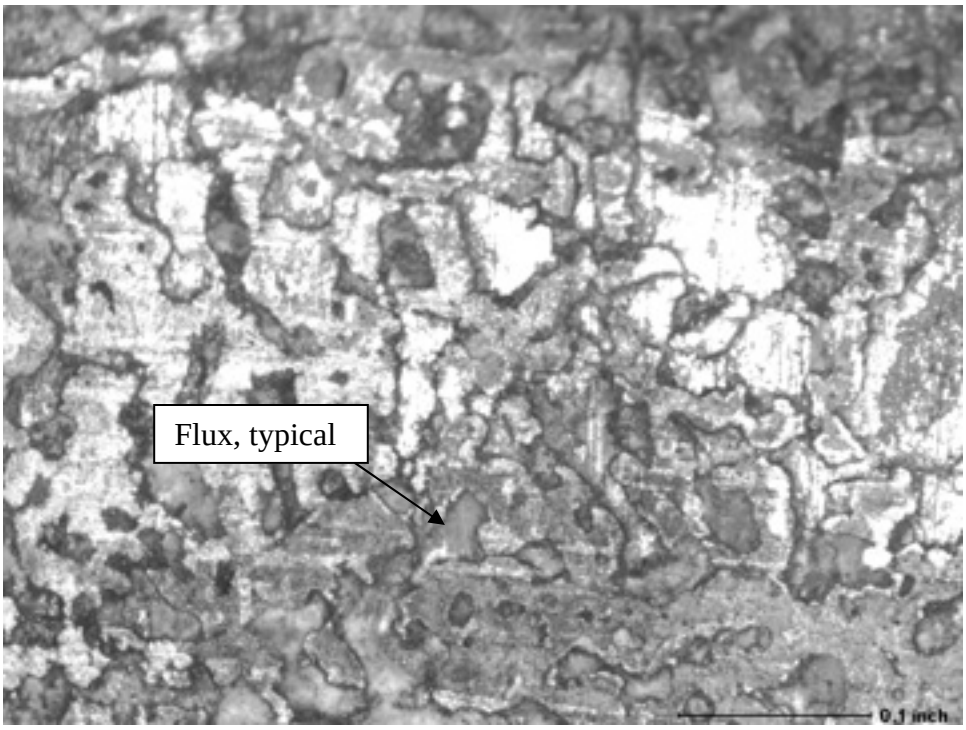


Fig. 6

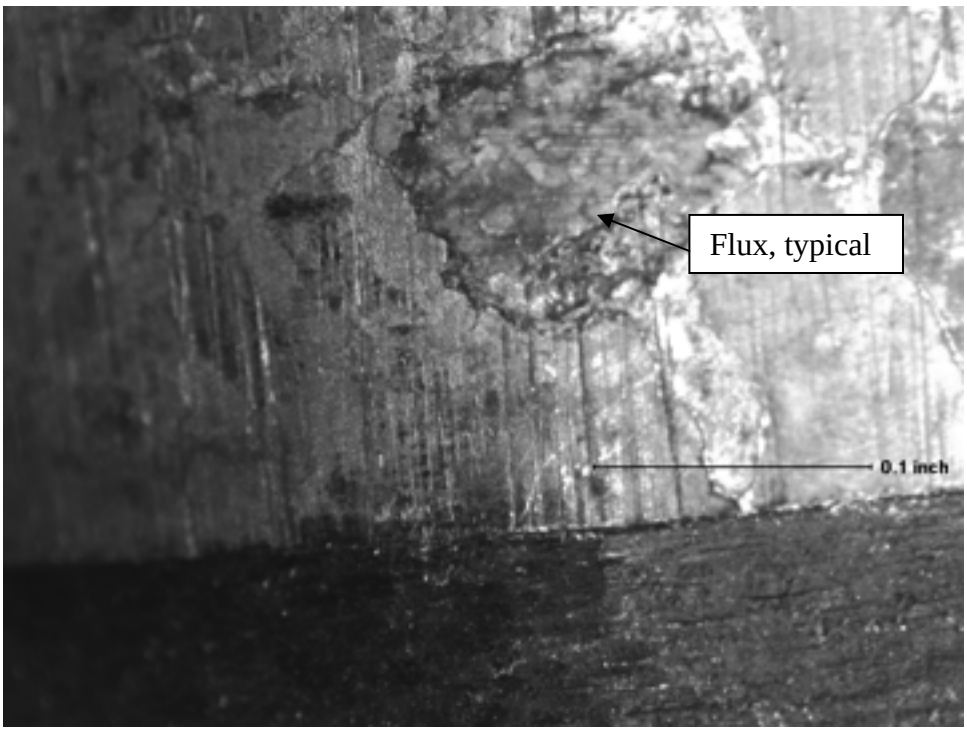


Fig. 7

The combination of large areas of trapped flux and no adhesion to the steel surfaces caused the defect in this joint that caused it to break far below its intended strength.

Opinions

The gun examined for this report was defective in the brazed joint that connected the barrel to the magazine. The defective braze joint caused the separation of the barrel form the magazine. The facts and reasoning for this opinion can be found in this report.

Signature & seal

Qualifications

Relevant Experience of Dr. Thompson

Dr. Thompson is qualified by education in engineering design, engineering mechanics, failure analysis, materials specifications, materials analysis and materials testing. He received a BSE in engineering in 1974 and a MSE in materials engineering in 1975 from the University of Alabama in Birmingham. He received a Ph.D. in materials science and engineering from Vanderbilt University in 1979.

Dr. Thompson is a registered engineer in Alabama, Arkansas and South Carolina and is a Fellow and a member in good standing with the American Society of Materials and the American Welding Society.

Dr. Thompson taught in the Ceramics Engineering Department at Clemson University from 1978 – 1981 and taught at UAB in the Department of Materials Engineering from 1981 – 2002. While in these positions he taught undergraduate and graduate level courses in engineering design, fracture mechanics, strength of materials, materials testing, and manufacturing practice. He also conducts award winning research in metal science and metal processing and has led various national and international committees in these areas.

In Dr. Thompson's private professional practice, he has acted as a consultant for industry in the selection and use of metals, the fabrication of products and the processing of materials. Dr. Thompson continues to be active in research through contracts with the Department of Defense and the National Science Foundation. He participates in national committees in engineering and reviews articles for technical publications in science and engineering. He has also served both plaintiff and defense lawyers as an expert in matters of engineering design, failure analysis and manufacturing methods.

Vista Engineering reserves the right to make addendums and changes to these findings and opinions based on new information and further investigation.

Appendix A

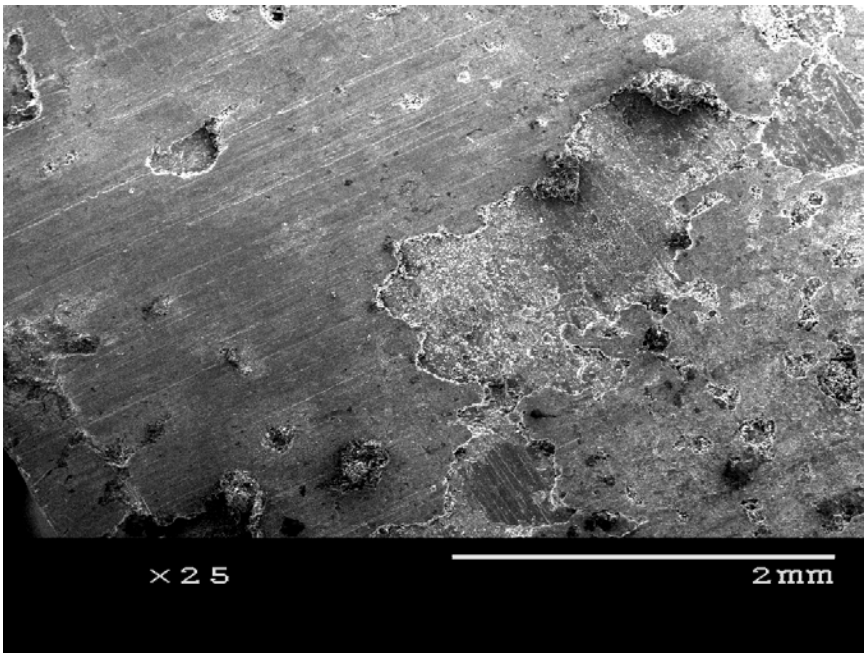


Figure A1: A1 25x

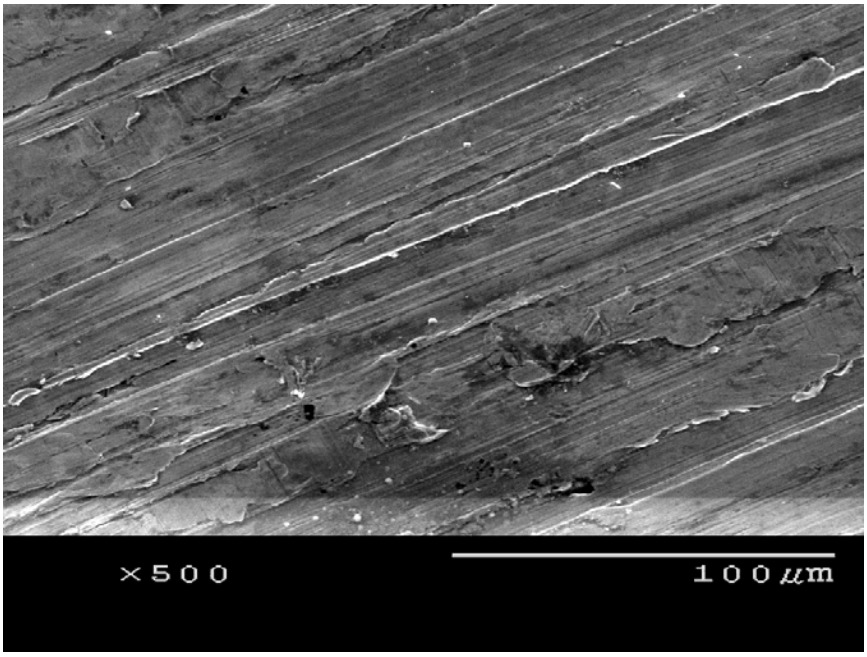


Figure A2: A1 500x

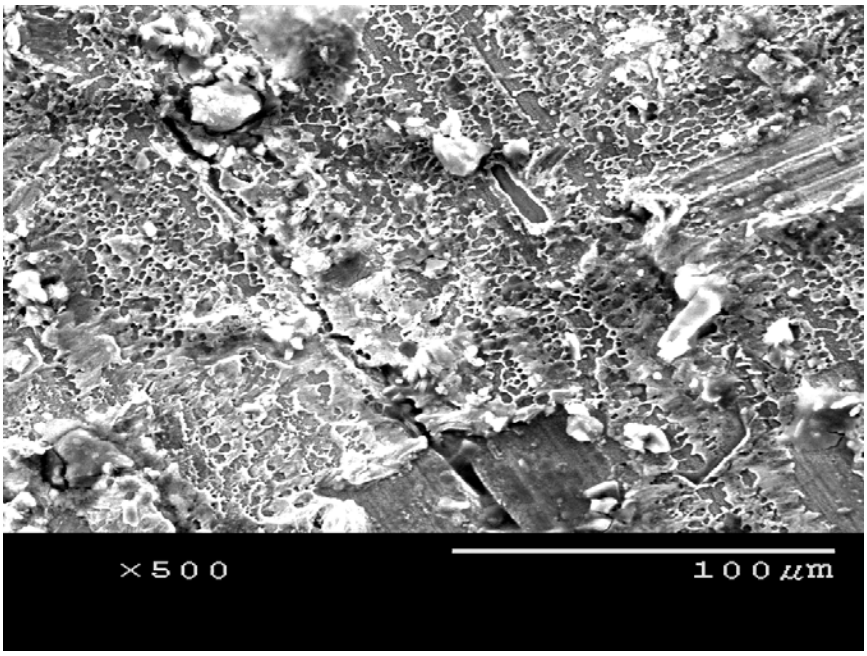


Figure A3: A2 500x 1

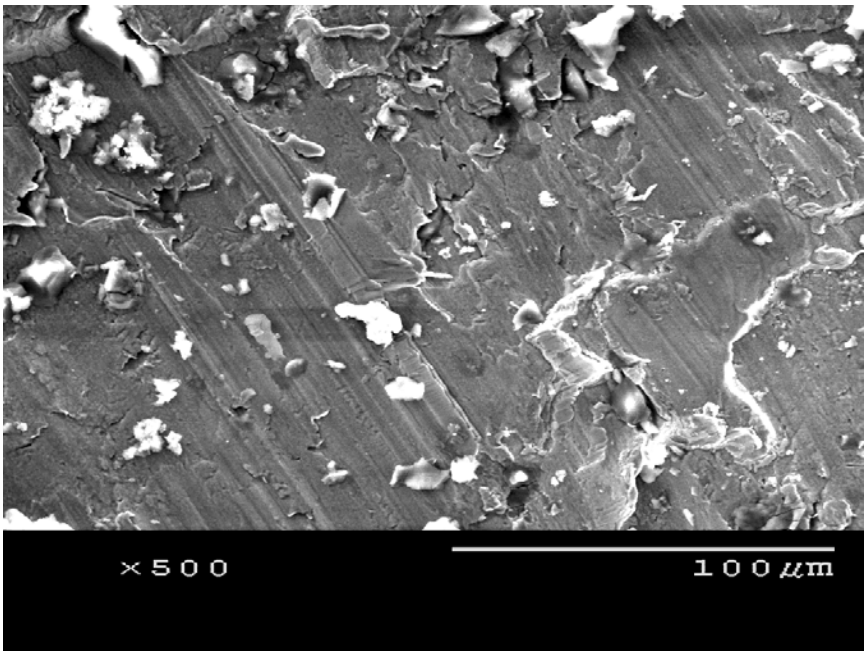


Figure A4: A3 500x

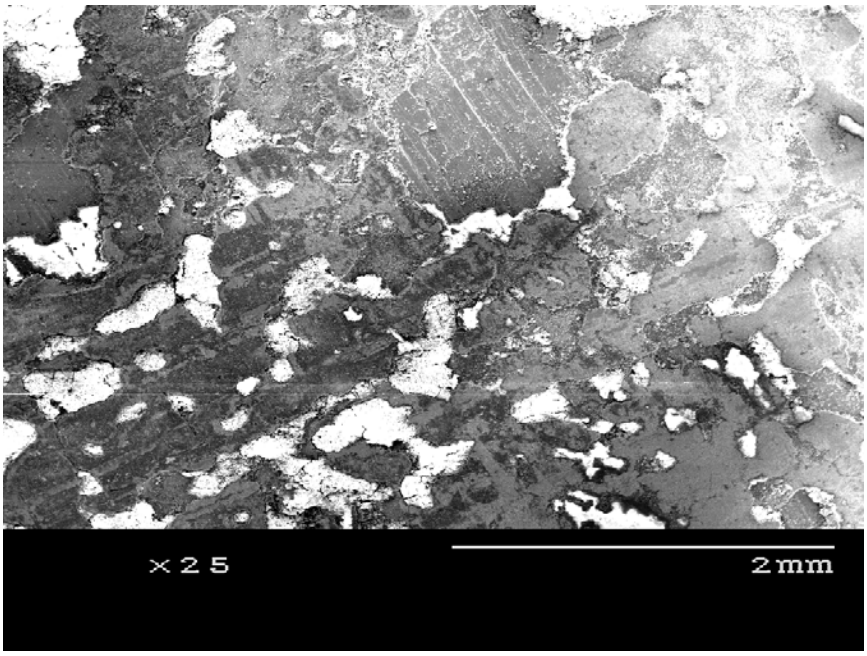


Figure A5: B1 25x

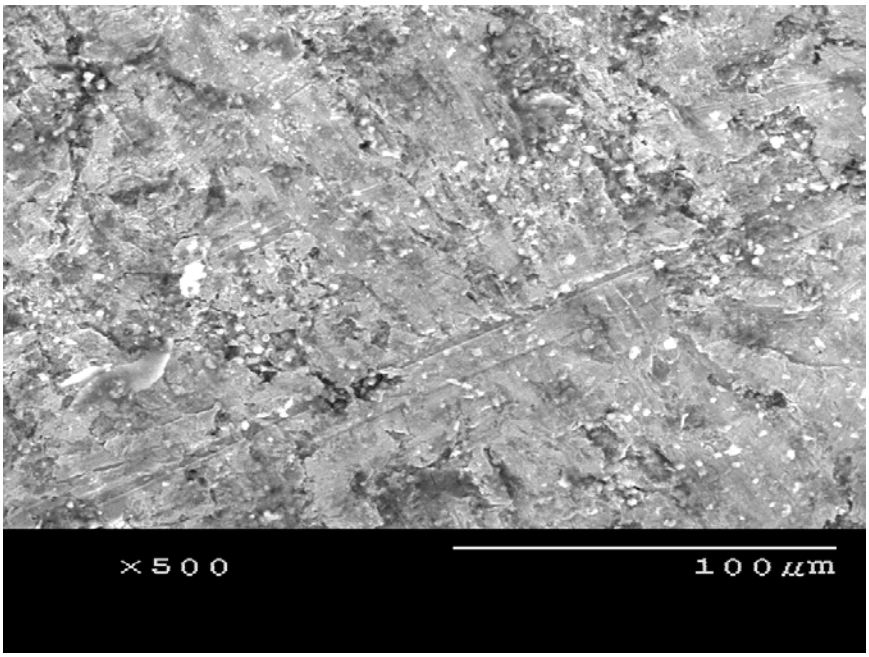


Figure A6: B1 500x

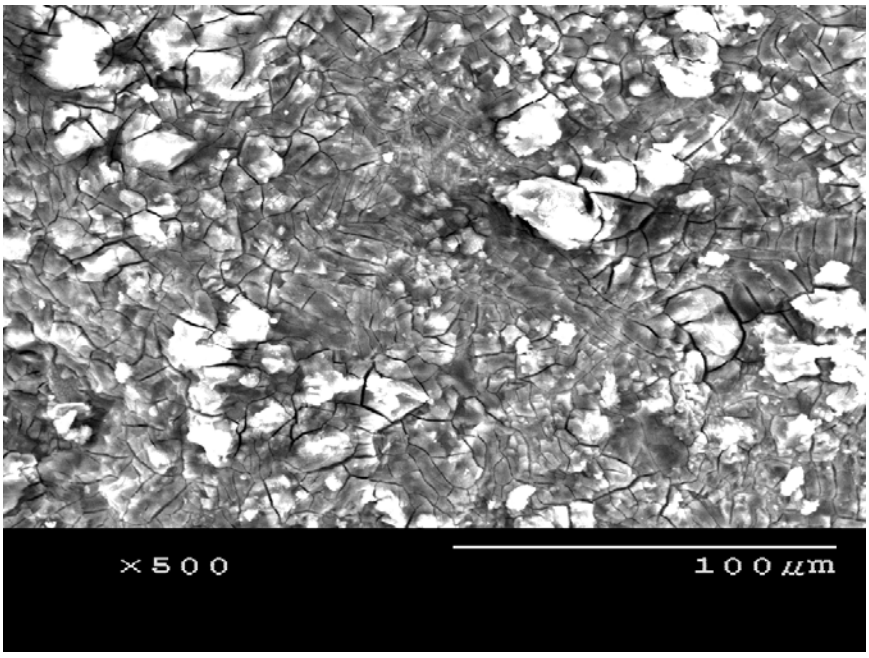


Figure A7: B2 500x

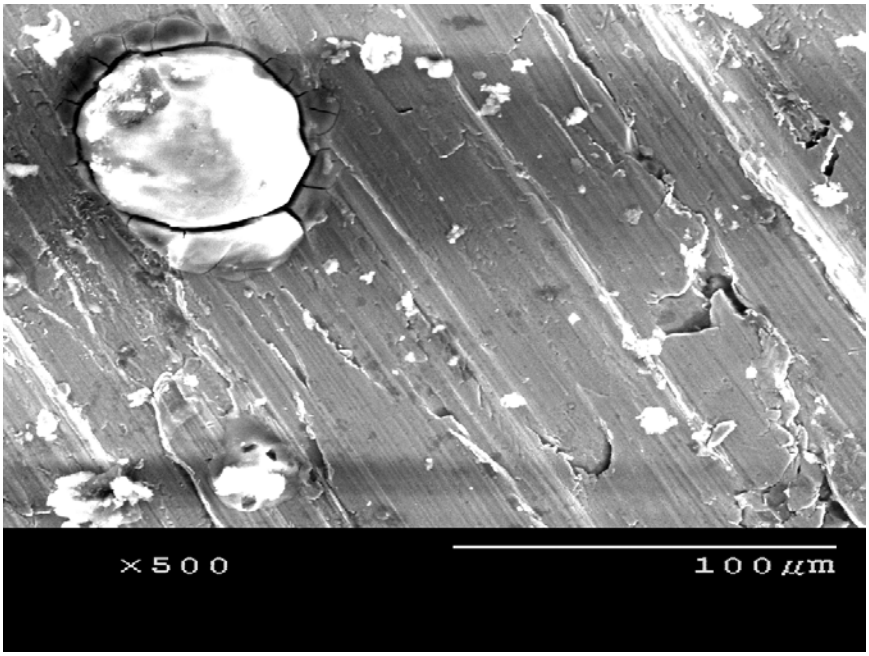


Figure A8: B3 500x

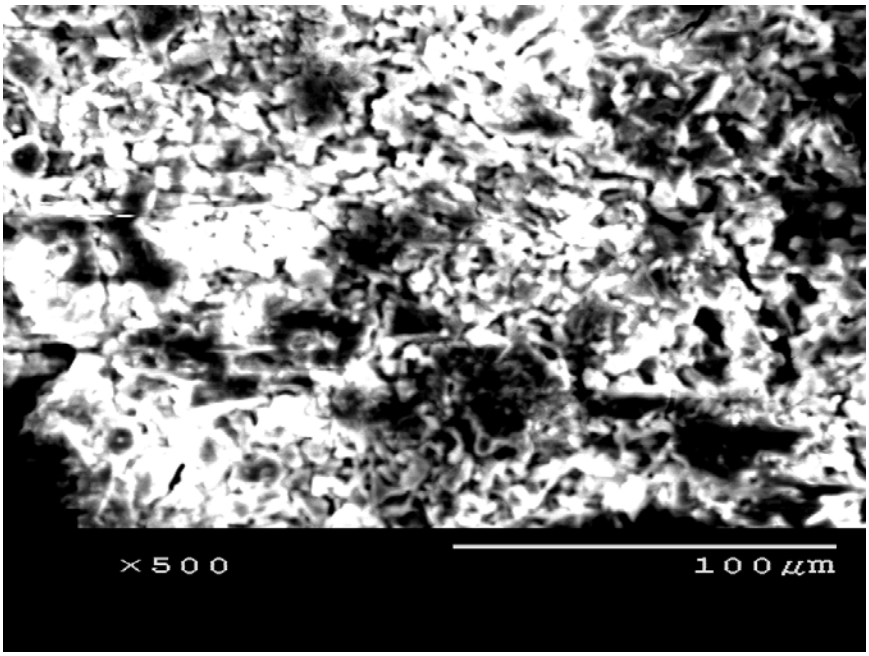


Figure A9: B4 500x

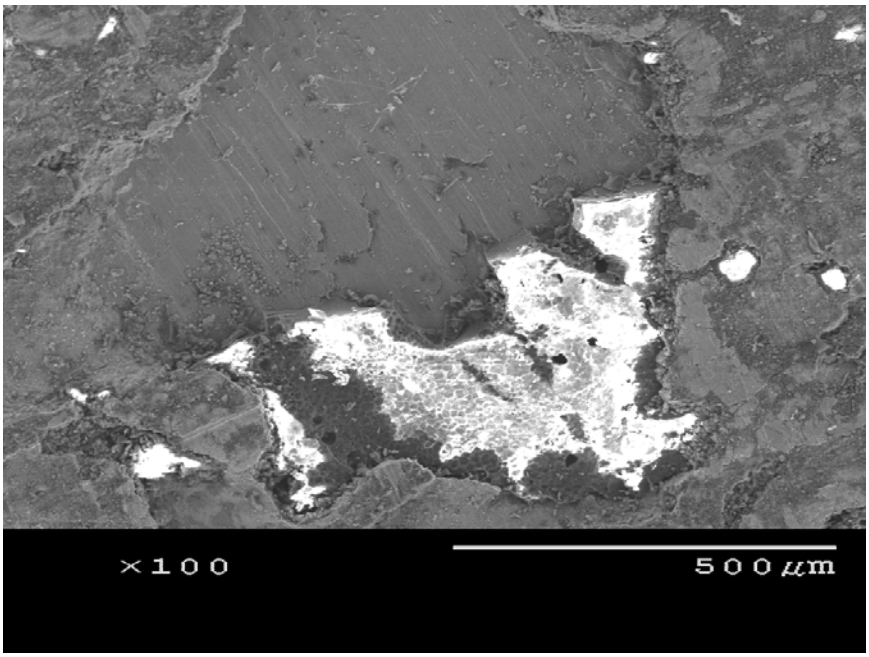


Figure A10: B5 500x

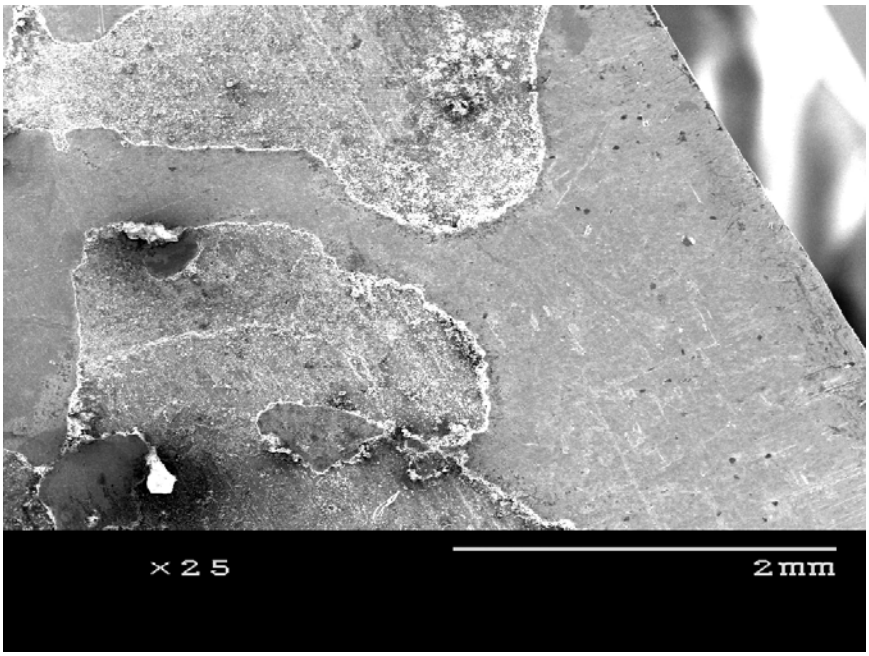


Figure A11: C1 25x

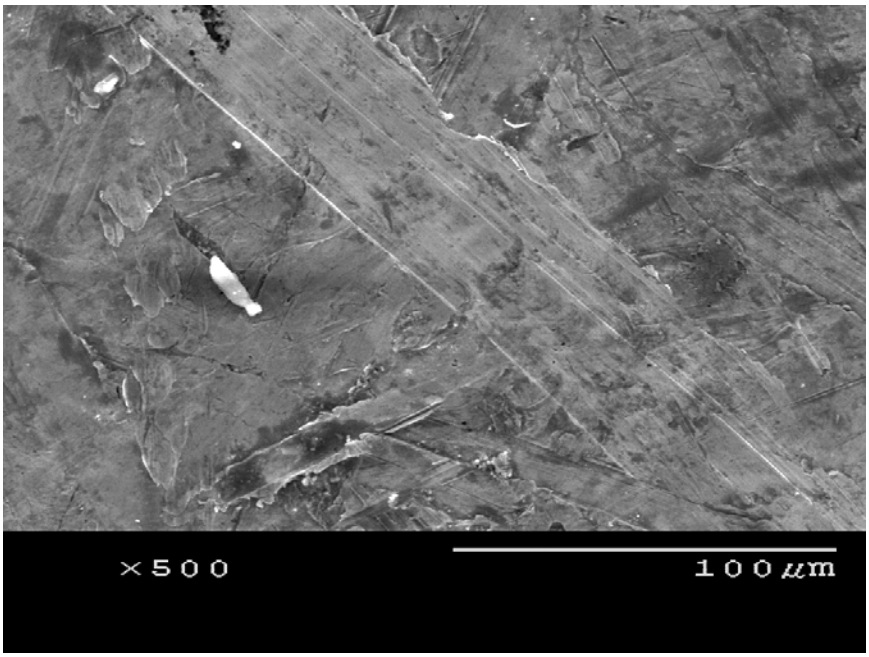


Figure A12: C1 500x

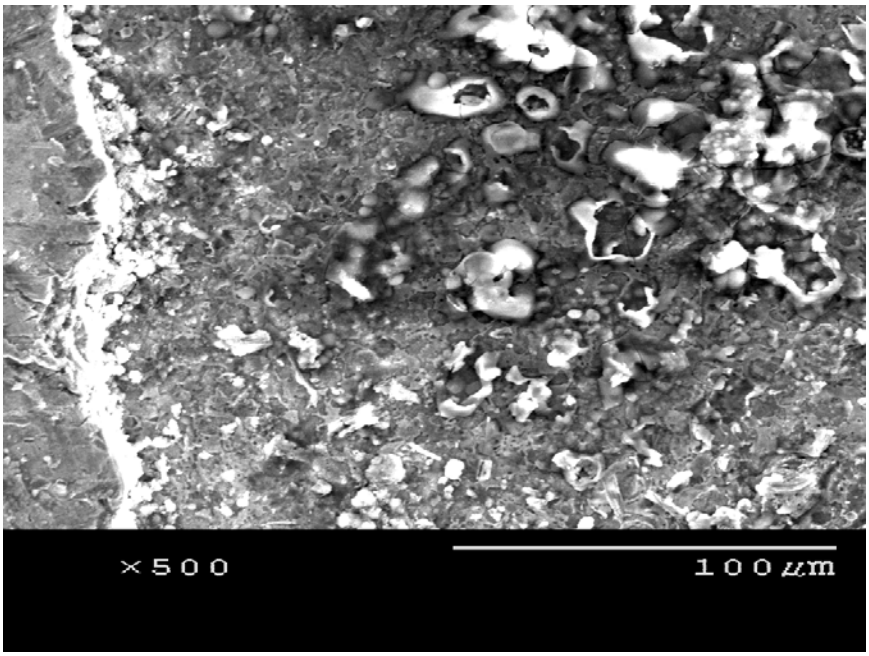


Figure A13: C2 500x

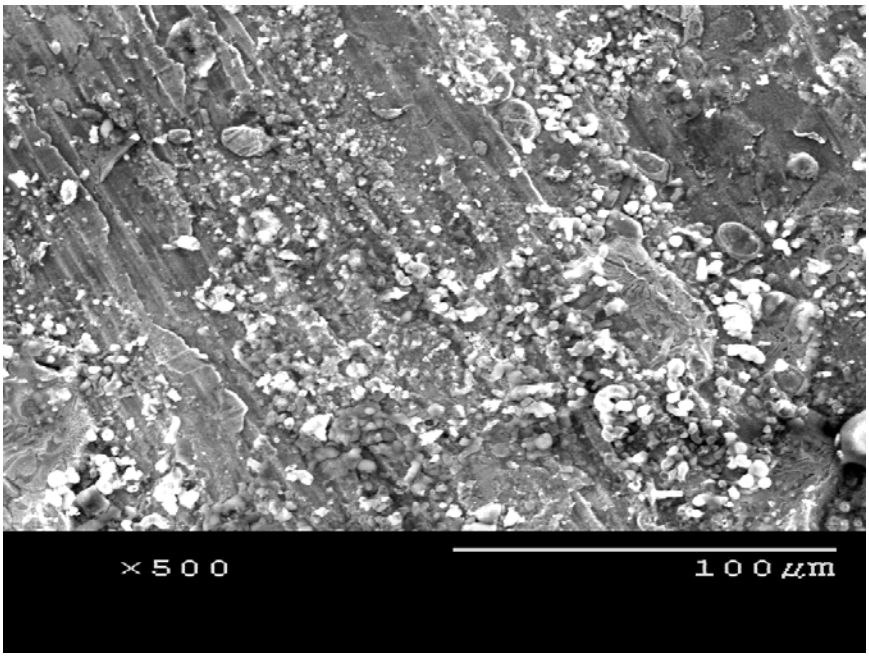


Figure A14: C3 500x

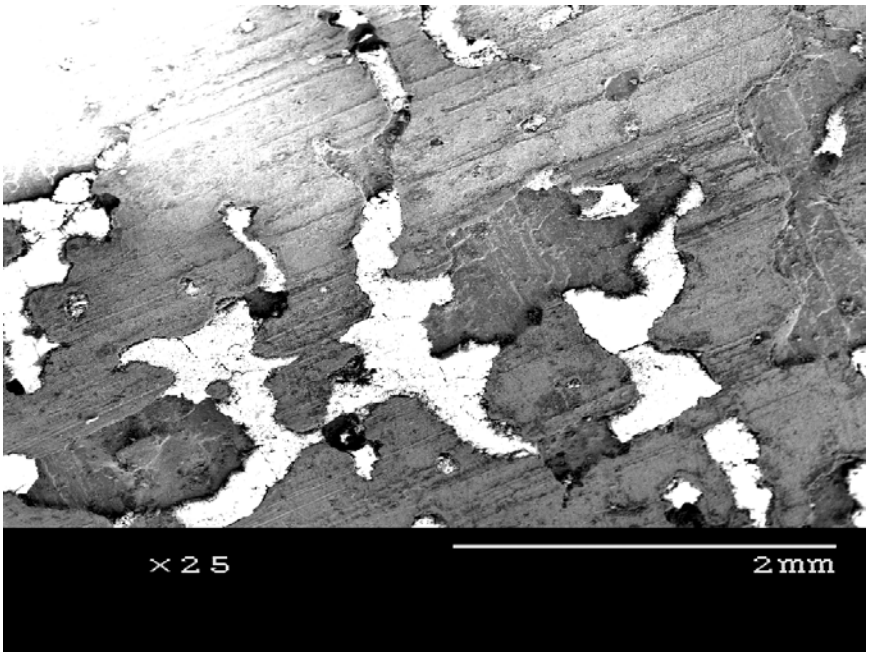


Figure A15: D1 25x

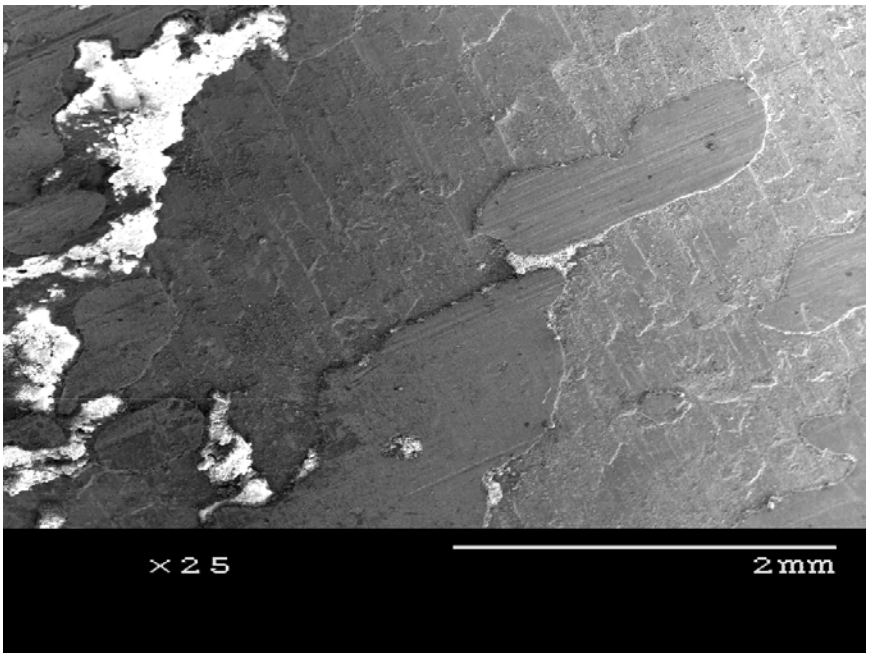


Figure A16: E1 25x

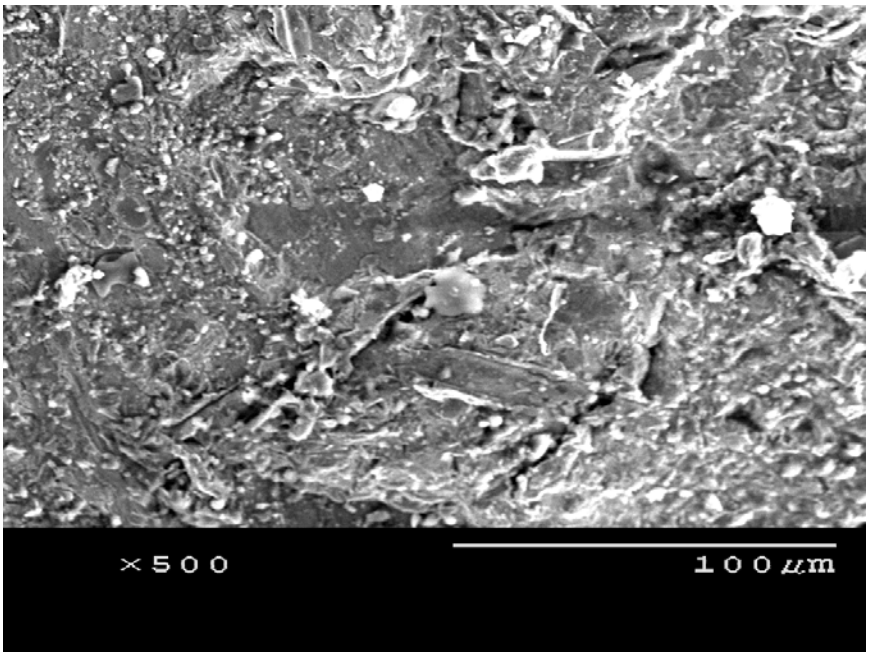


Figure A17: E2 500x

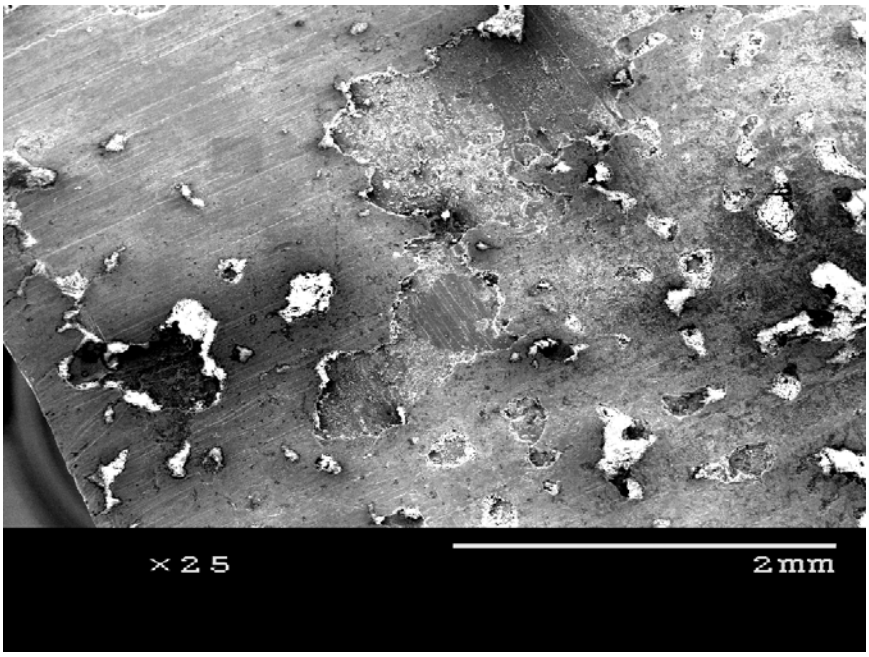


Figure A18: F1 25x

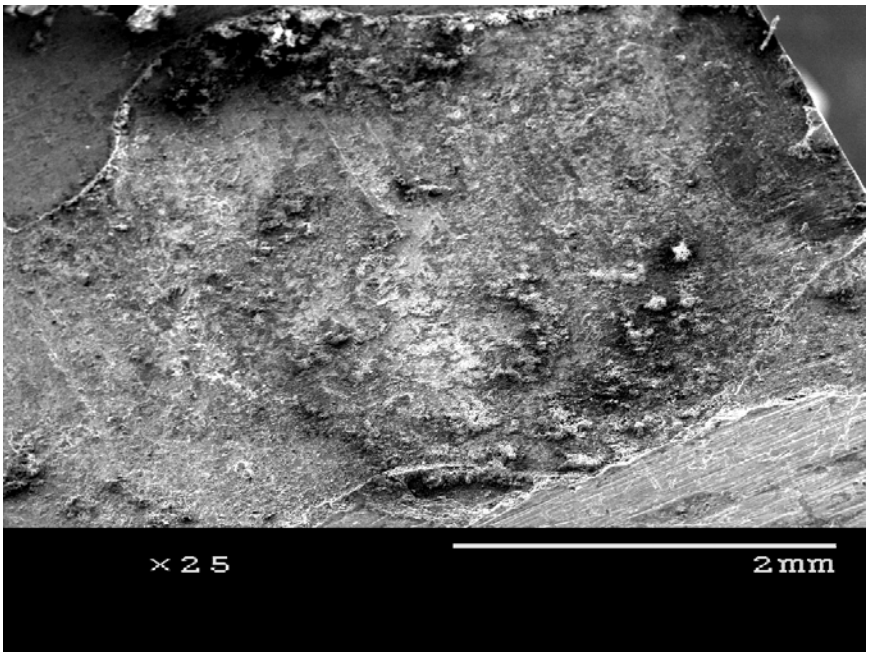


Figure A19: G1 25x

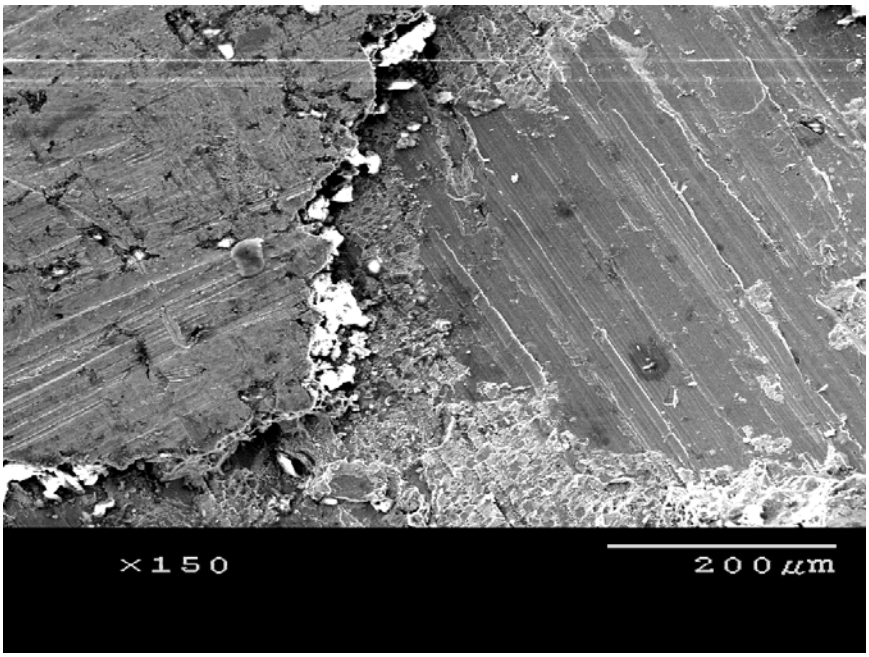


Figure A20: G1 150x

Appendix B

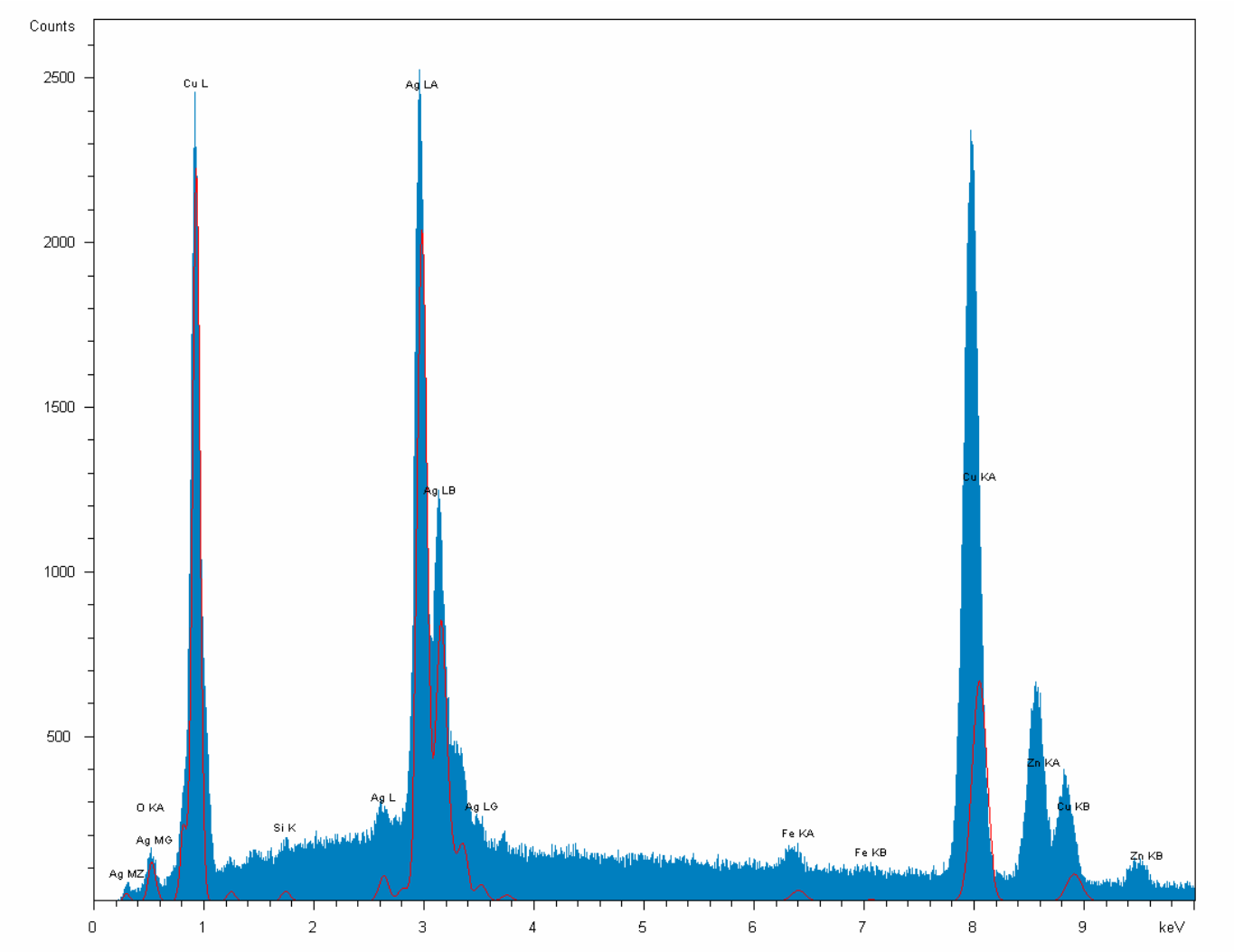


Figure B1: A1 EDS 500x 1

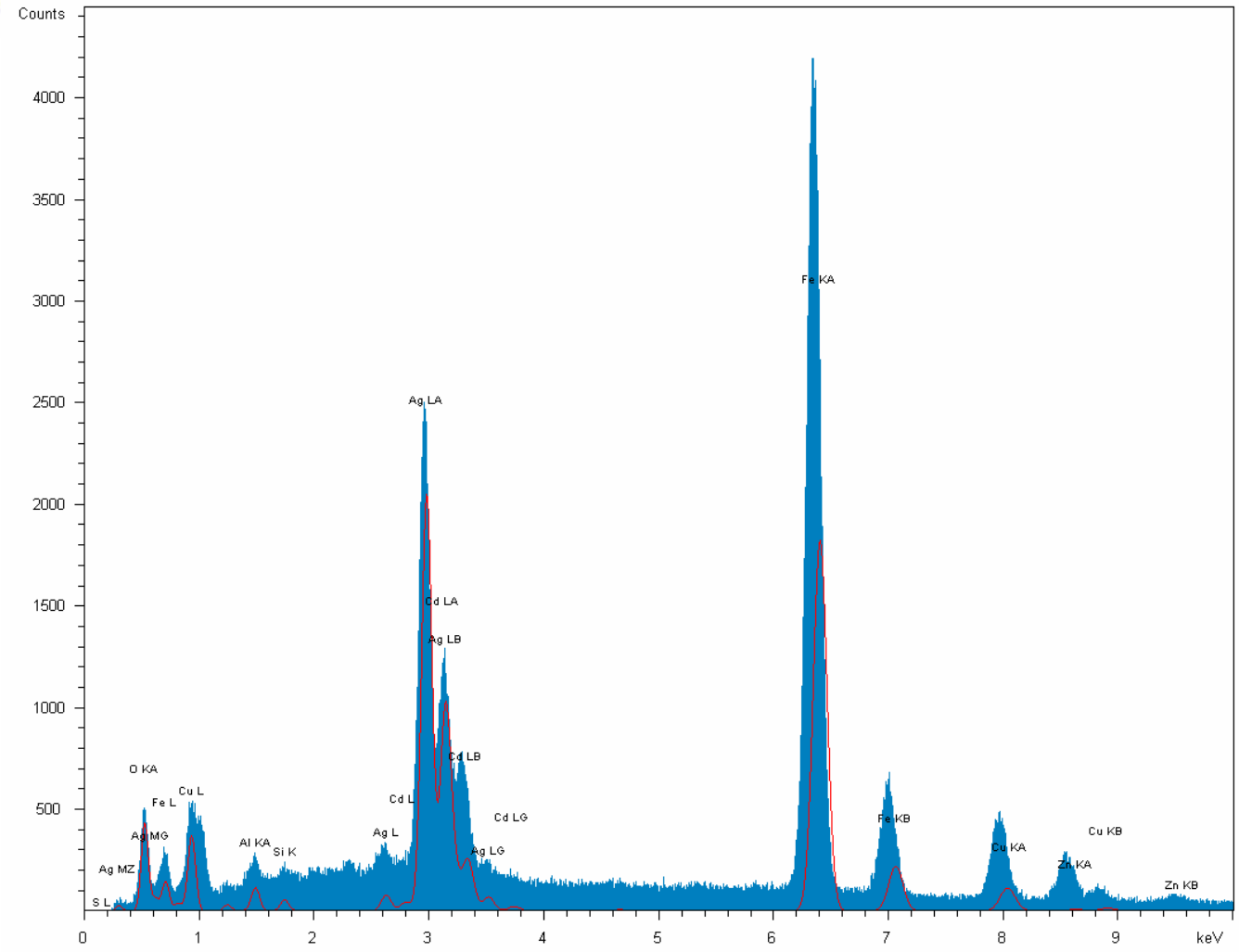


Figure B2: A2 EDS 500x 1

1

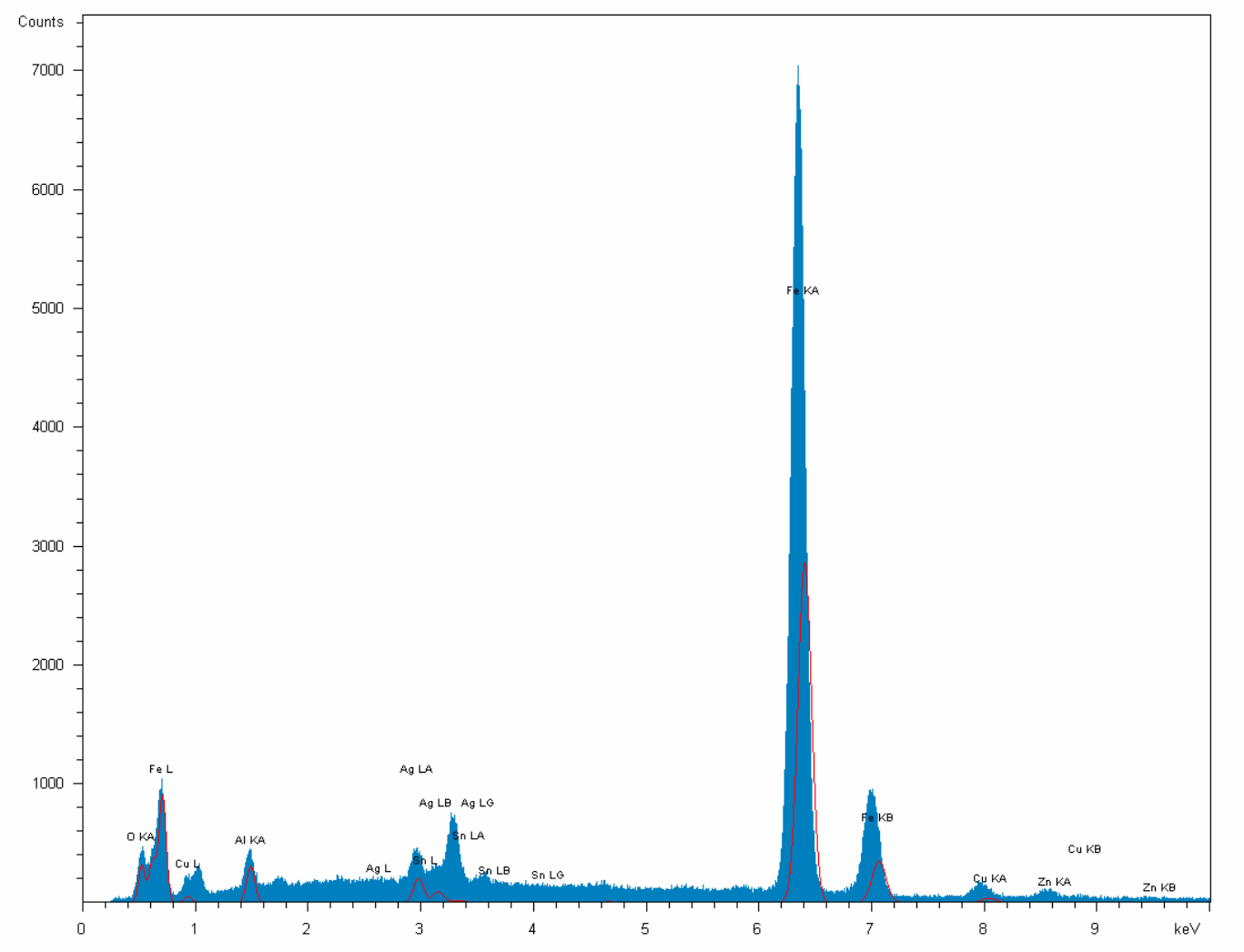


Figure B3: A3 EDS 500x 1 1

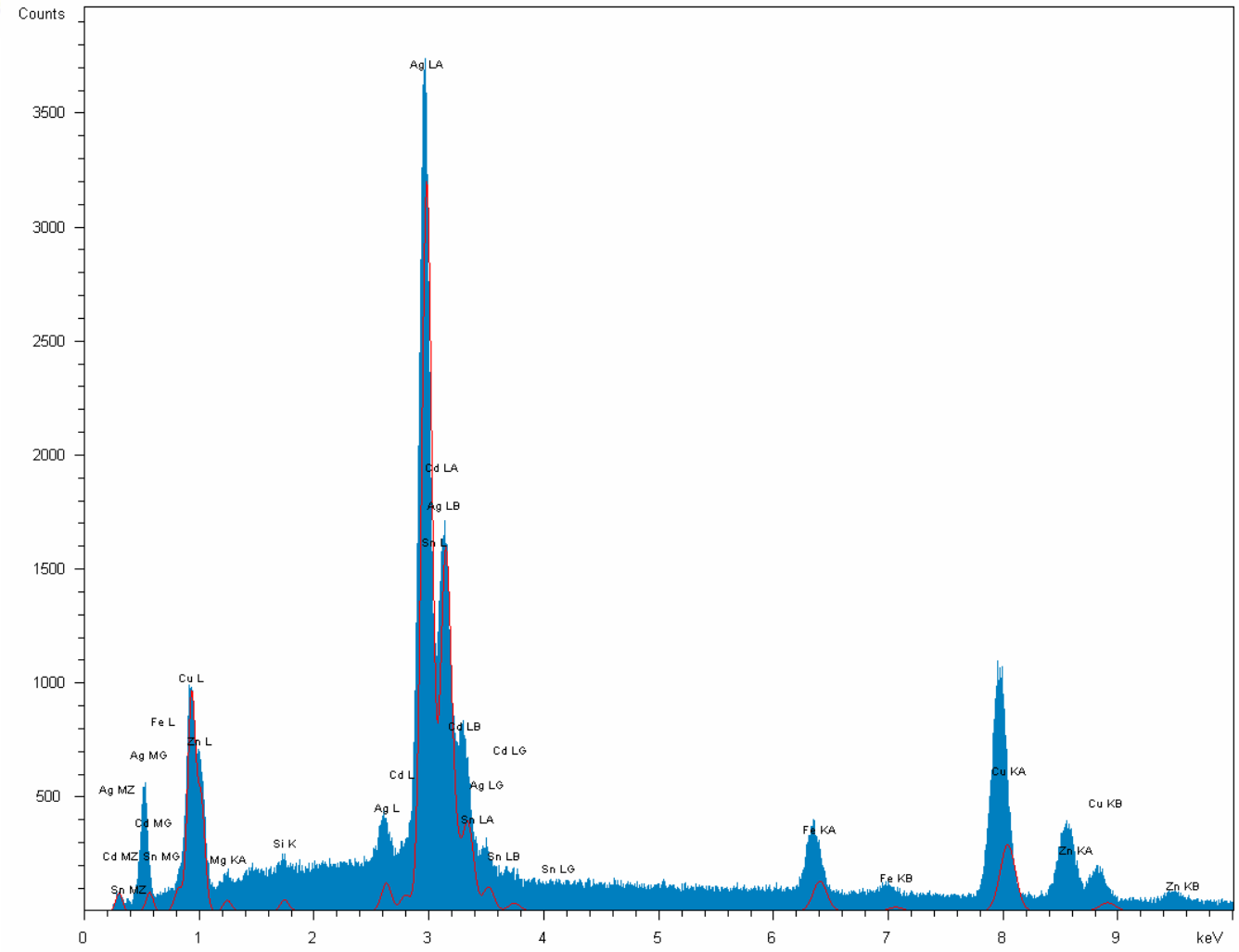


Figure B4: B1 EDS 500x

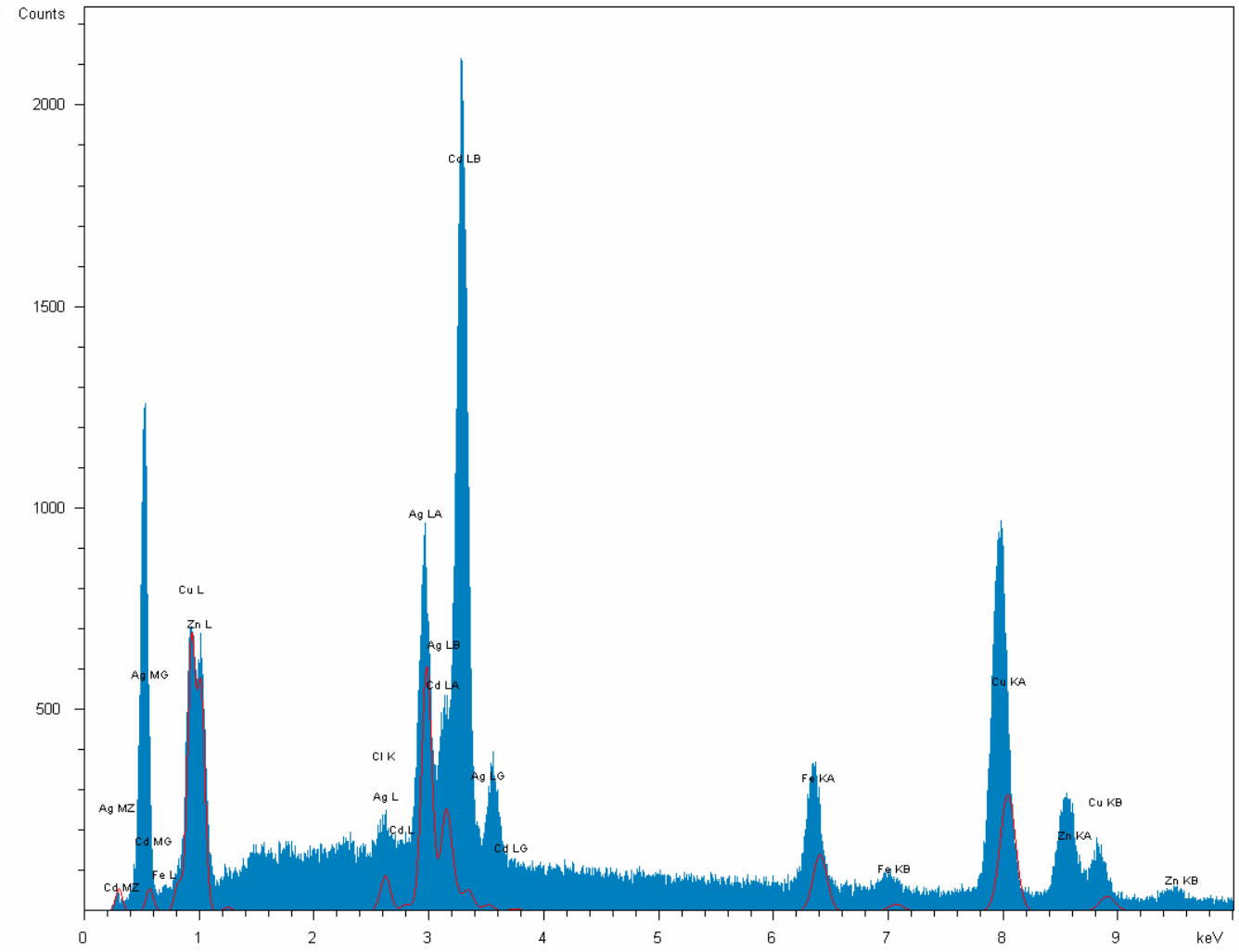


Figure B5: B2 EDS 500x

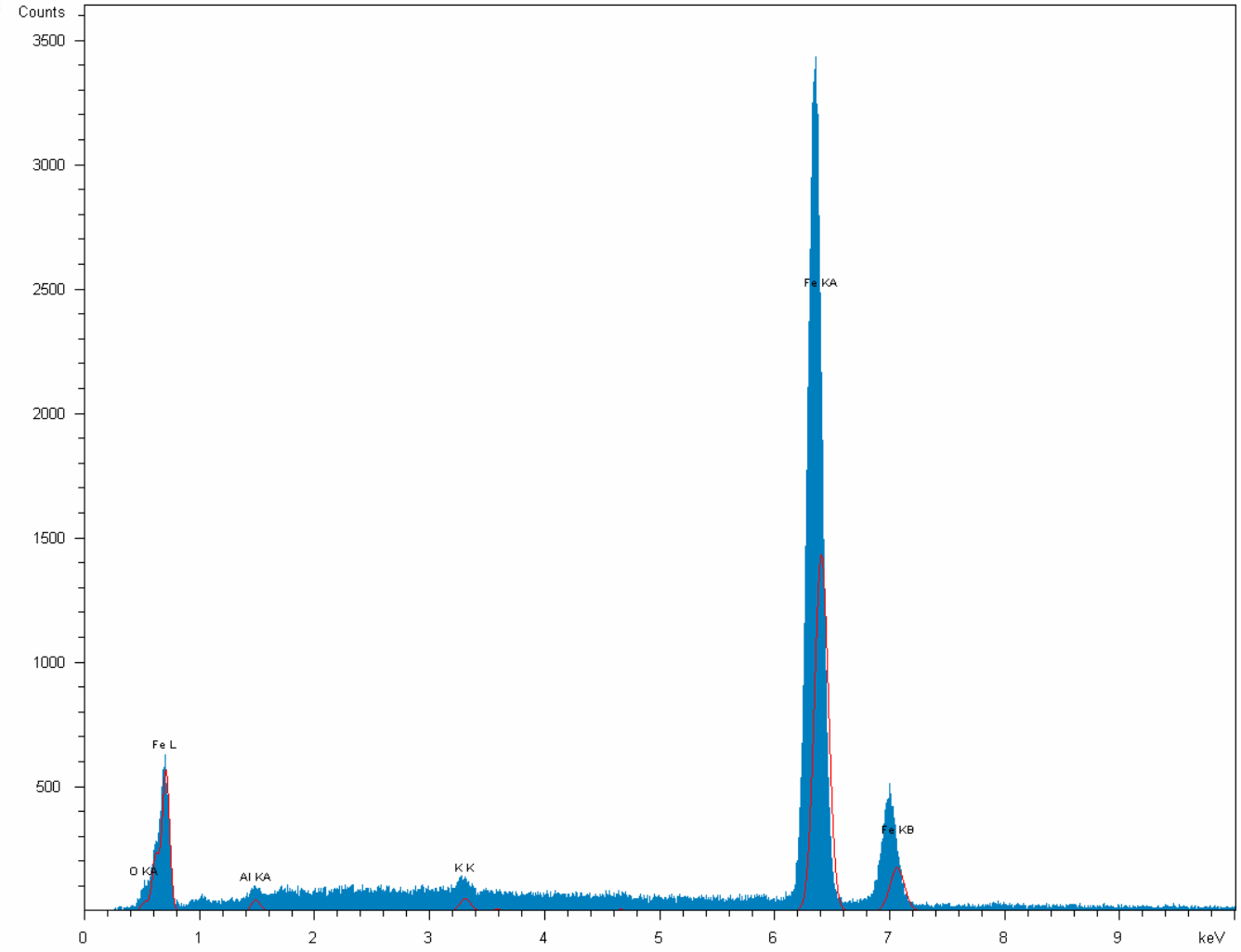


Figure B6: EDS 500x

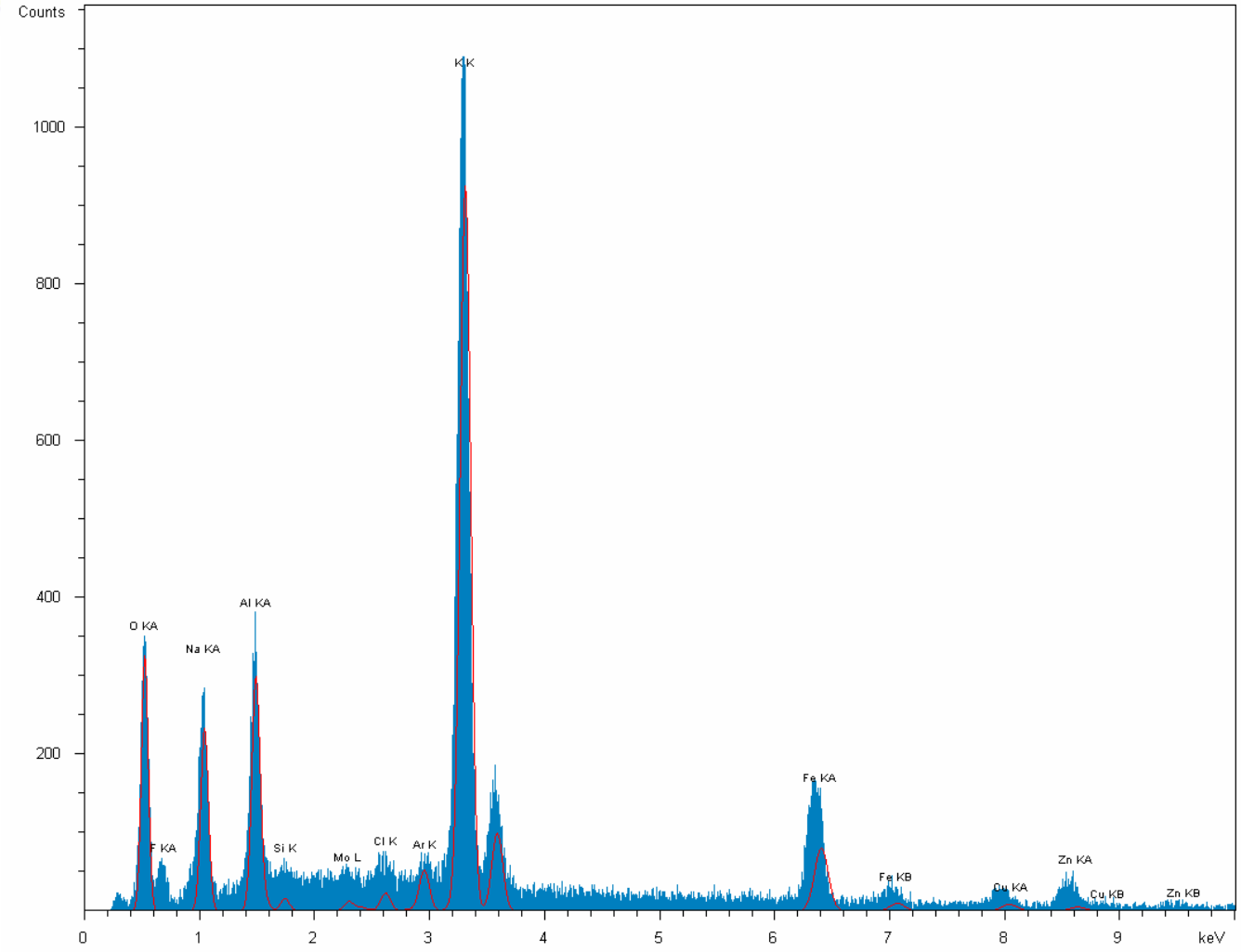


Figure B7: B3 Particle 1 EDS 500x 1

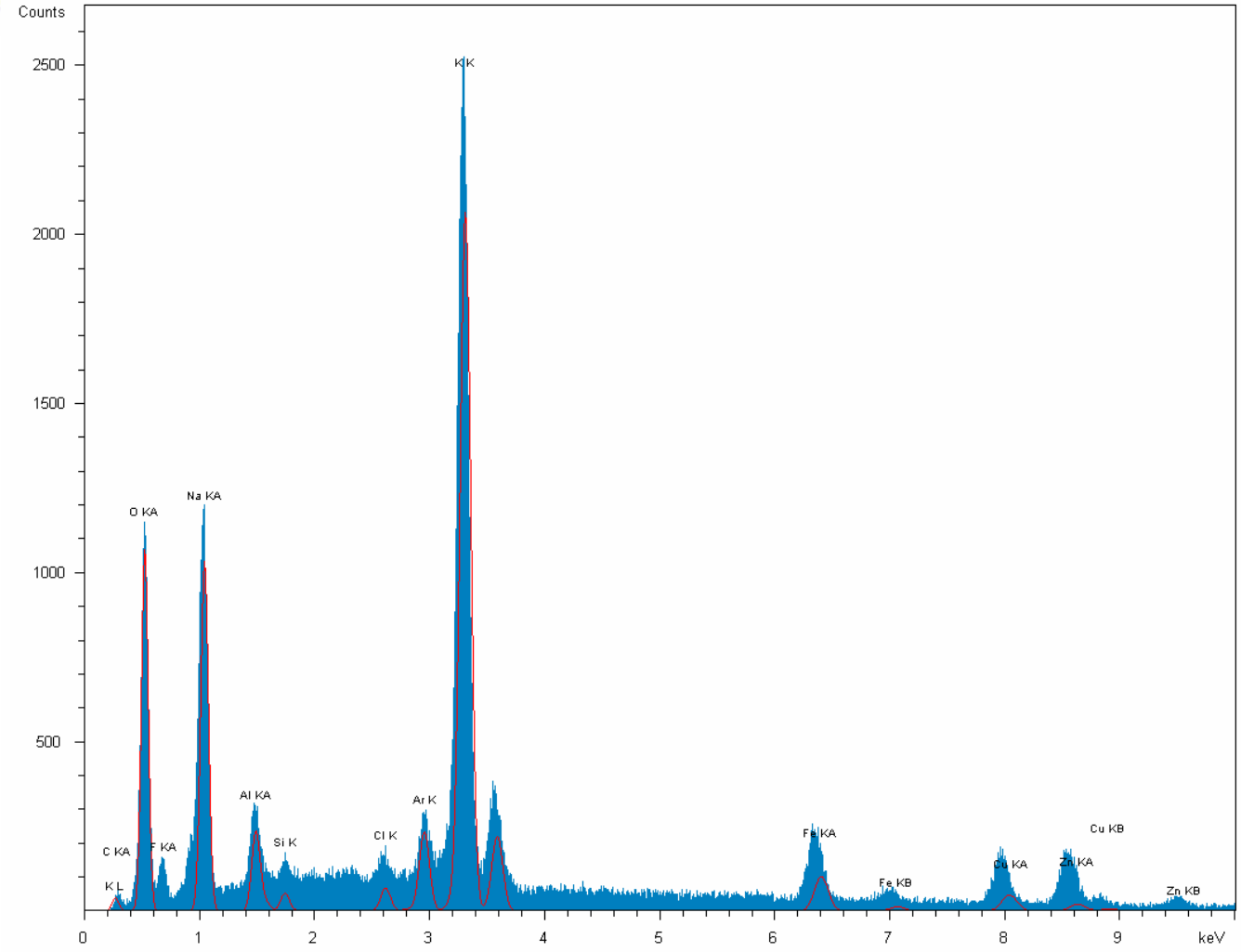


Figure B8: B4 EDS 500x

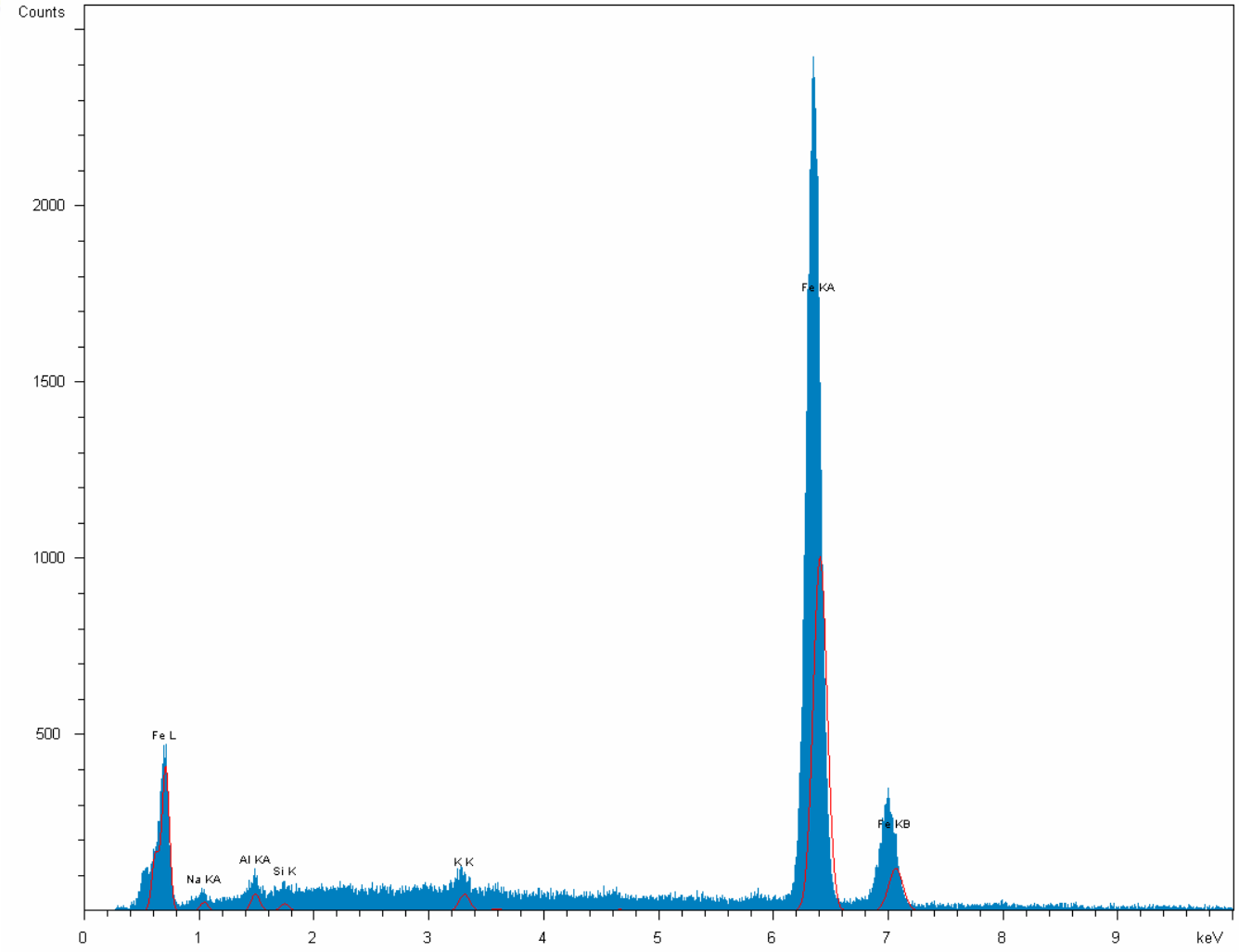


Figure B9: B5 EDS 500x

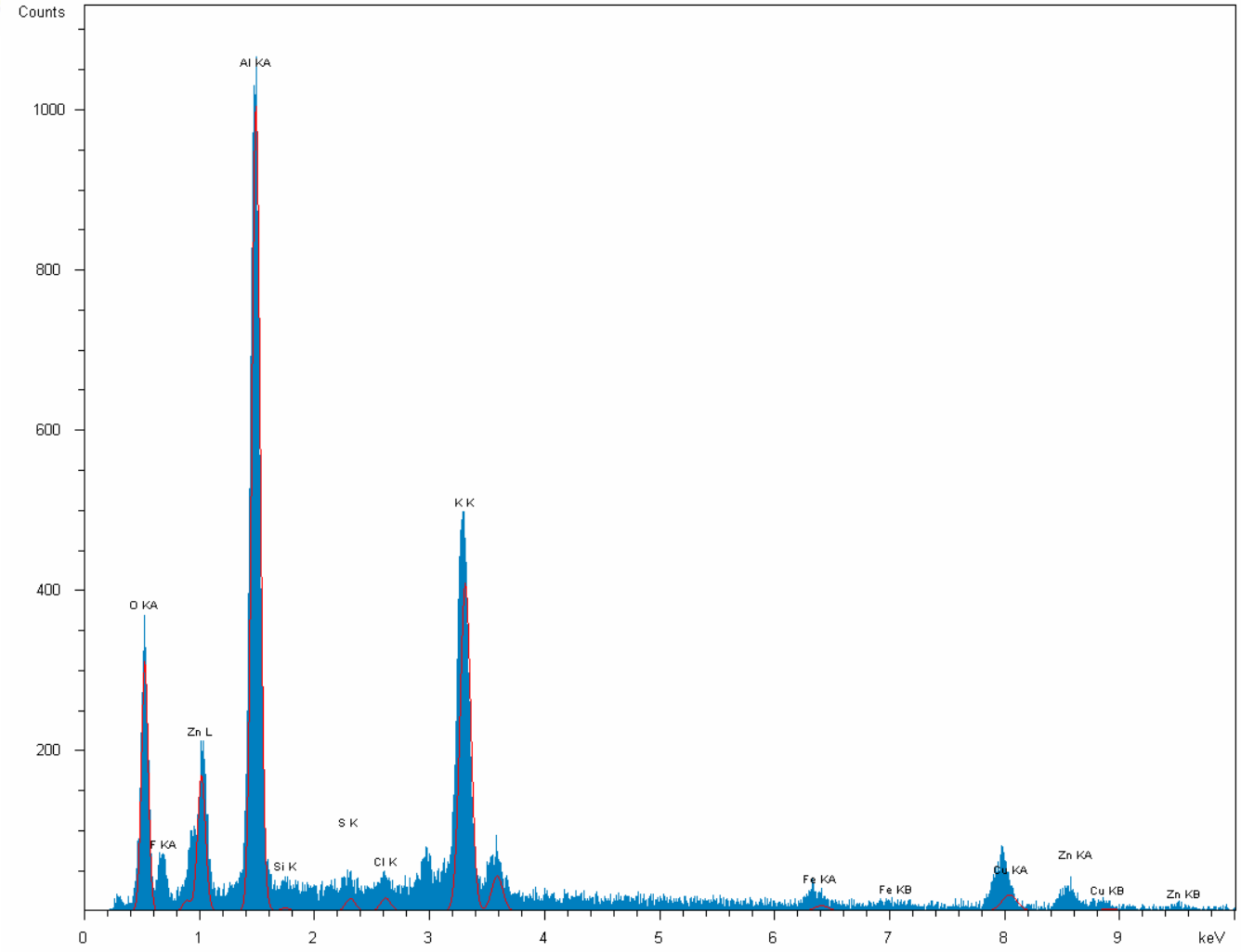


Figure B10: B5 EDS2 500x

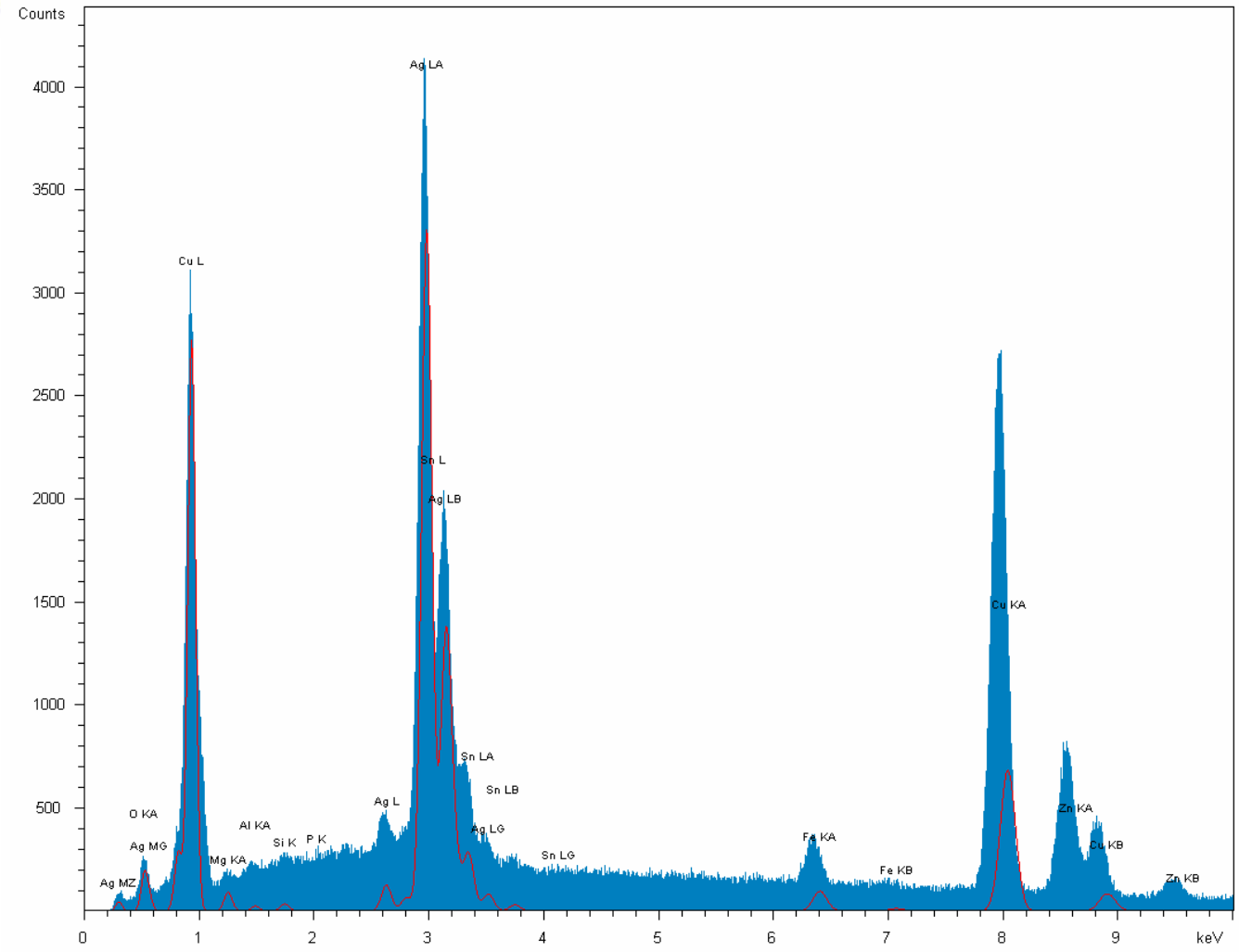
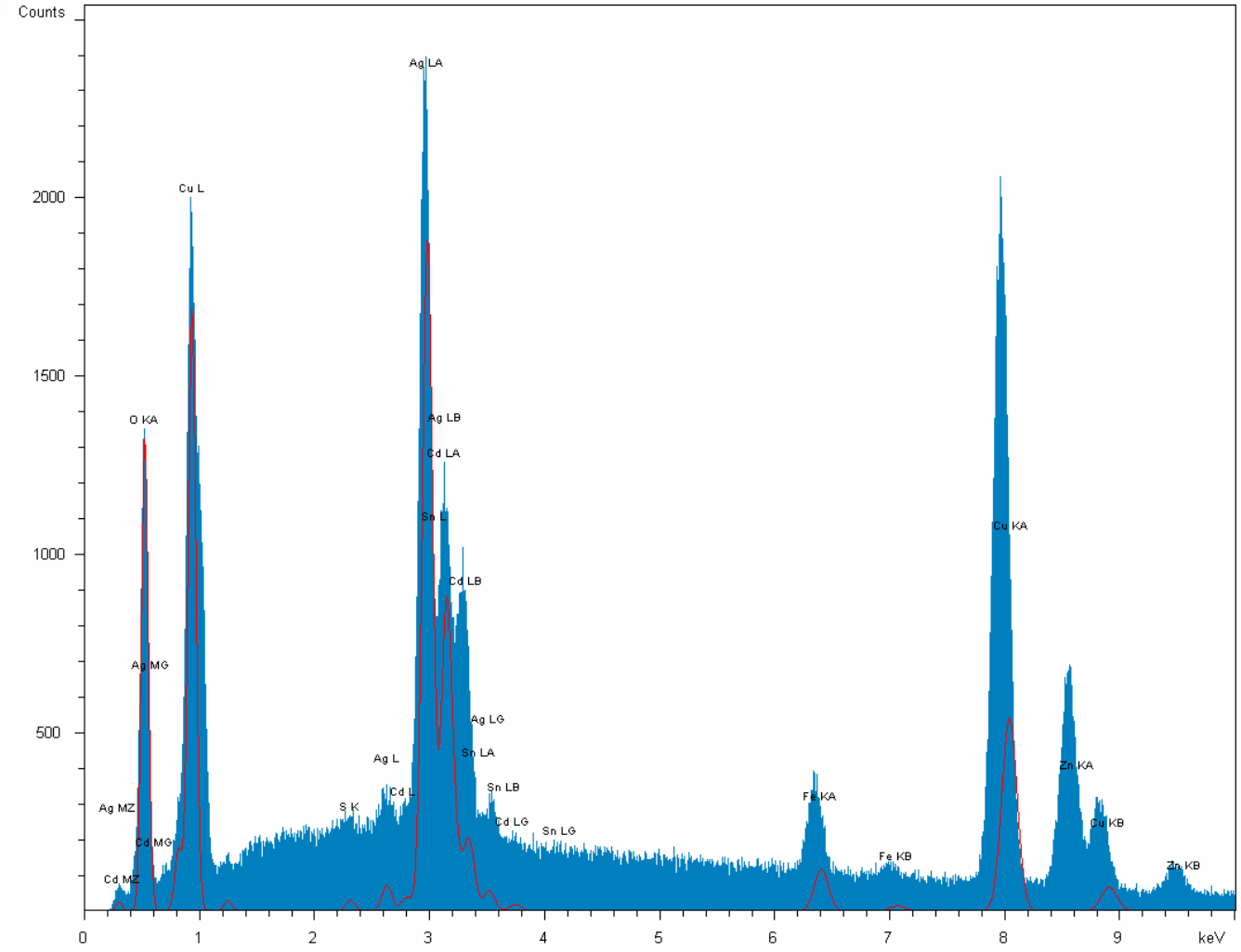


Figure B11: C1 EDS 500x



B12: C2 EDS 500x

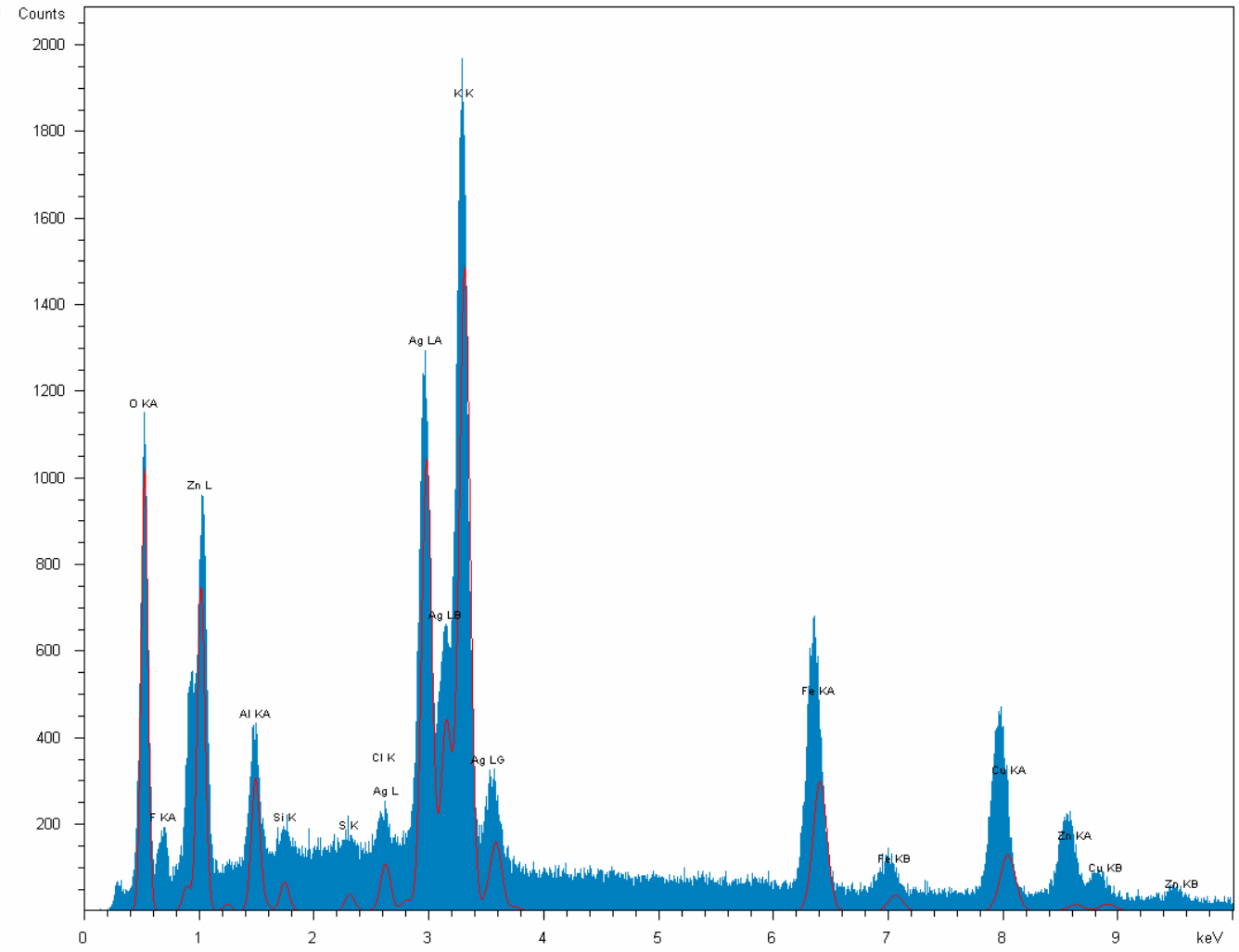


Figure B13: D1 EDS 500x

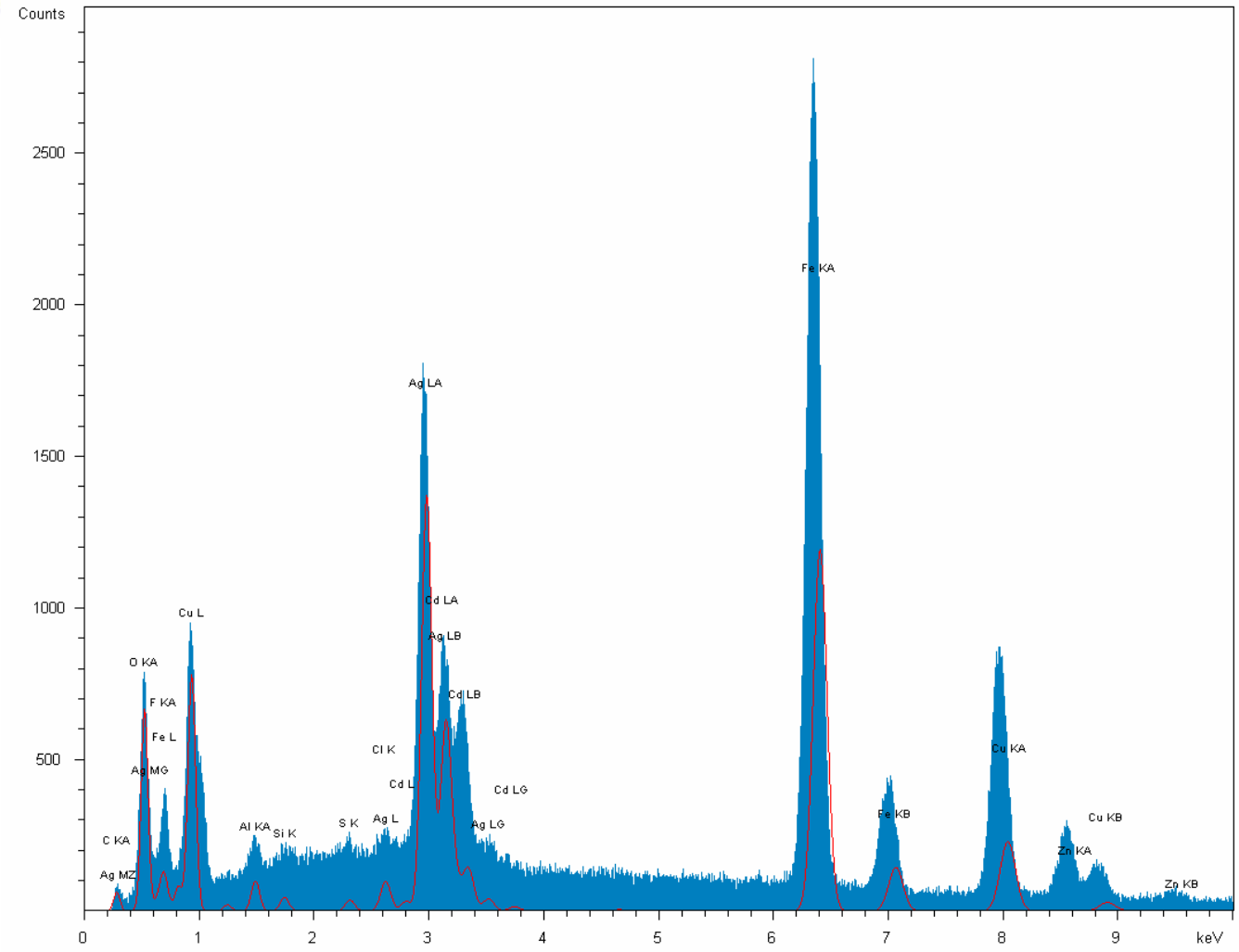


Figure B14: E2 EDS 500x

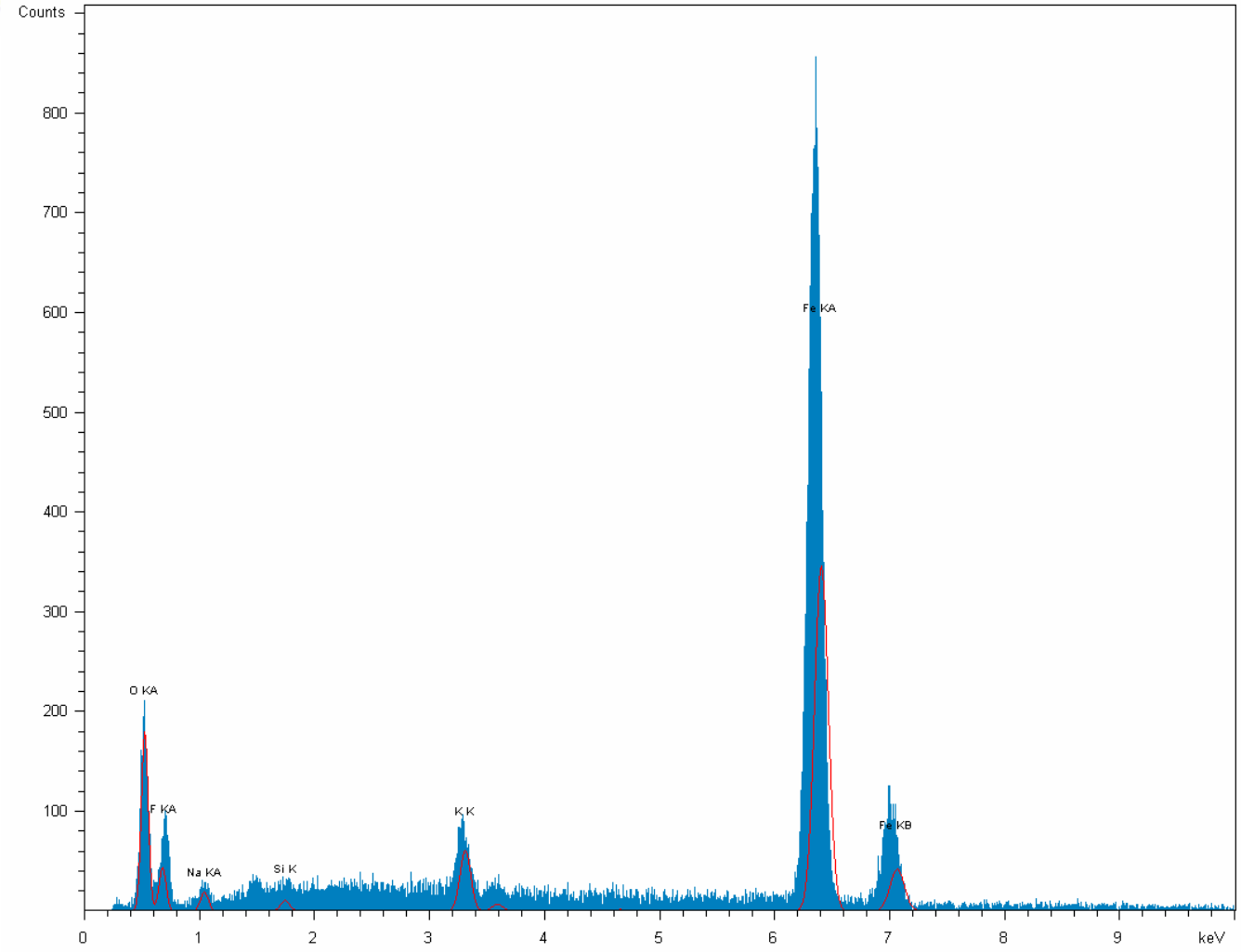


Figure B15: E3 EDS 500x

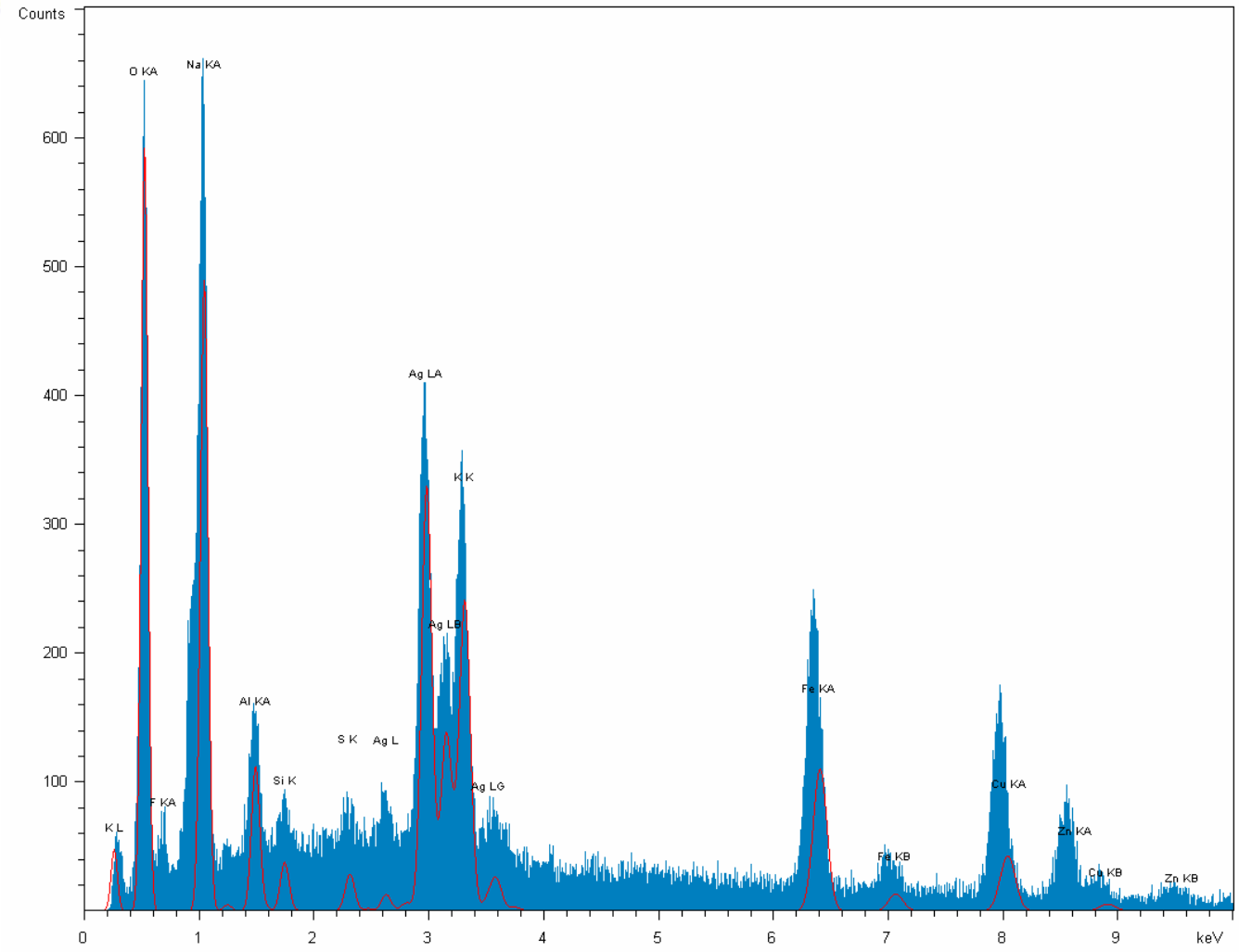


Figure B16: G1 EDS Bright 3000x 1

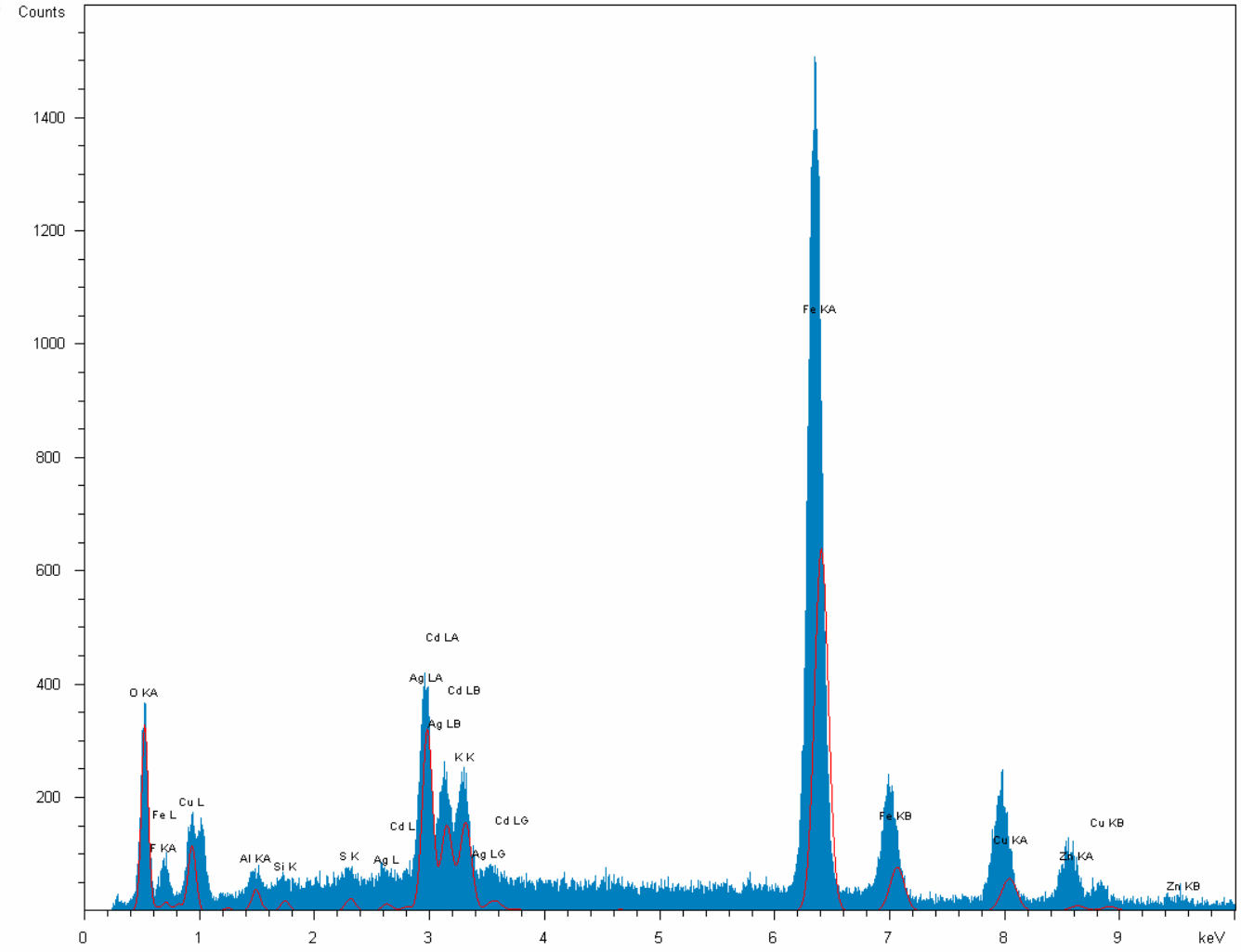
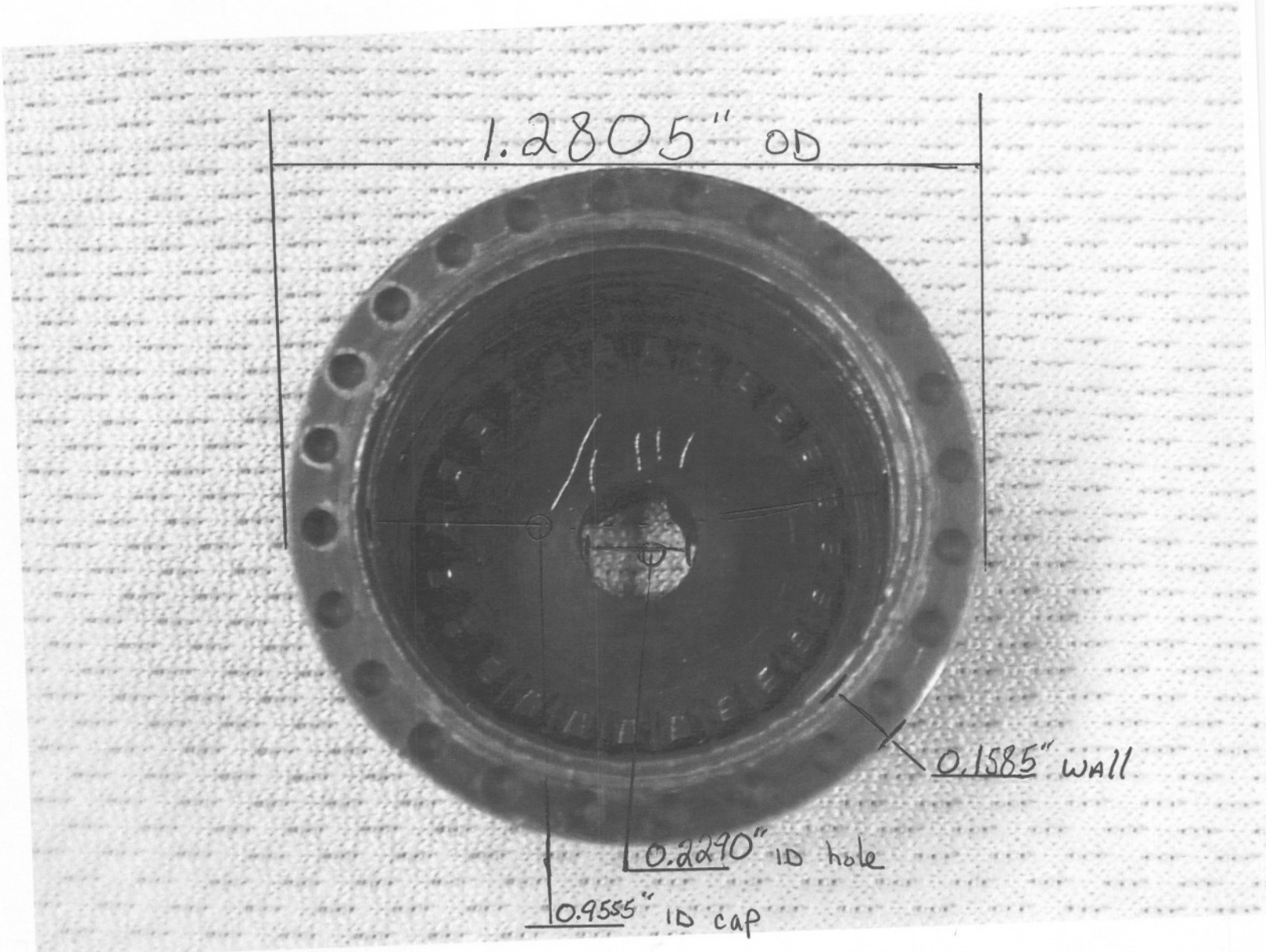


Figure B17: G2 EDS 500x 1

Appendix C

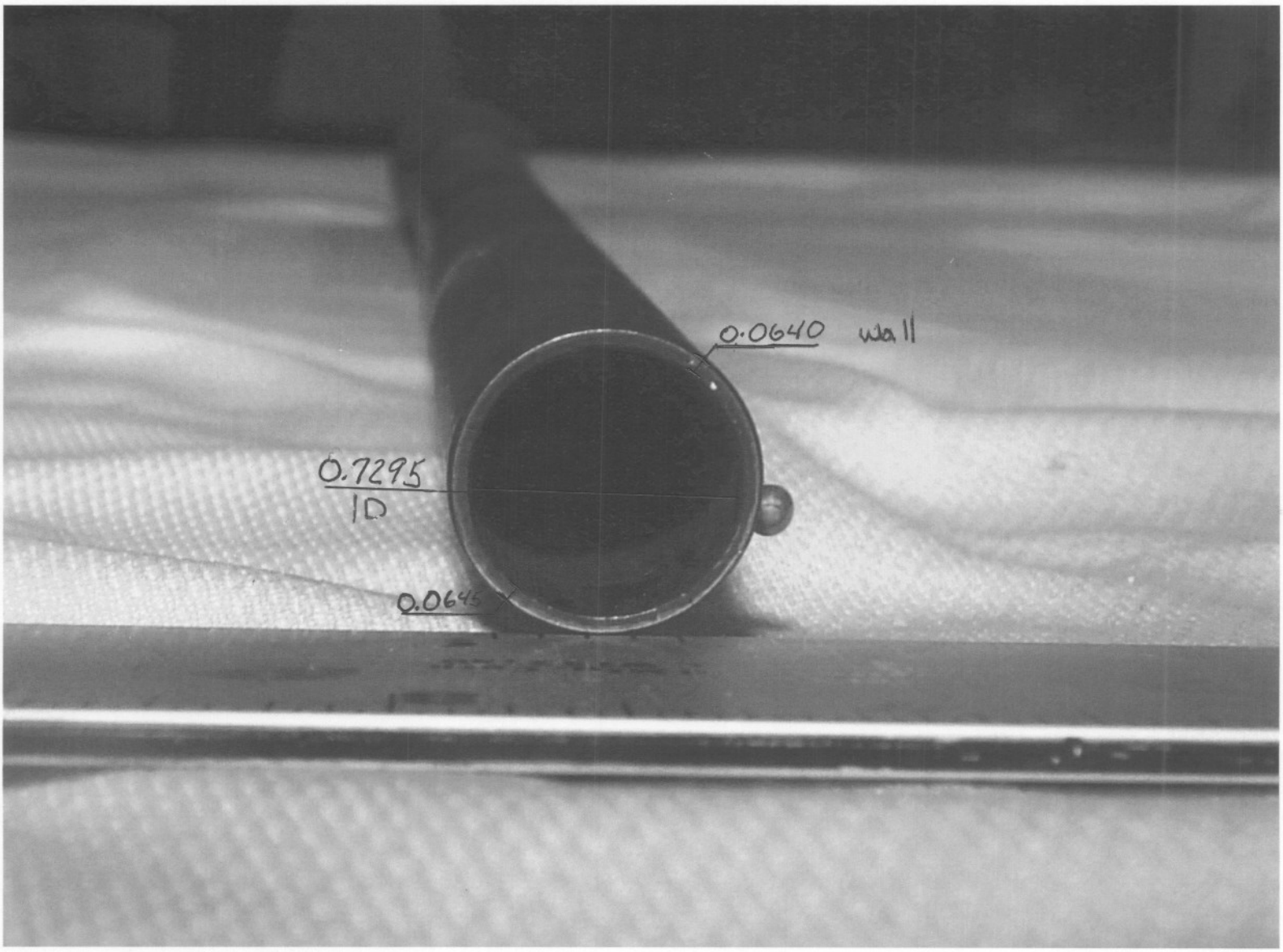
1 of 7
11/27/07
Hodge Shotgun
Measurements

Gun Barrel

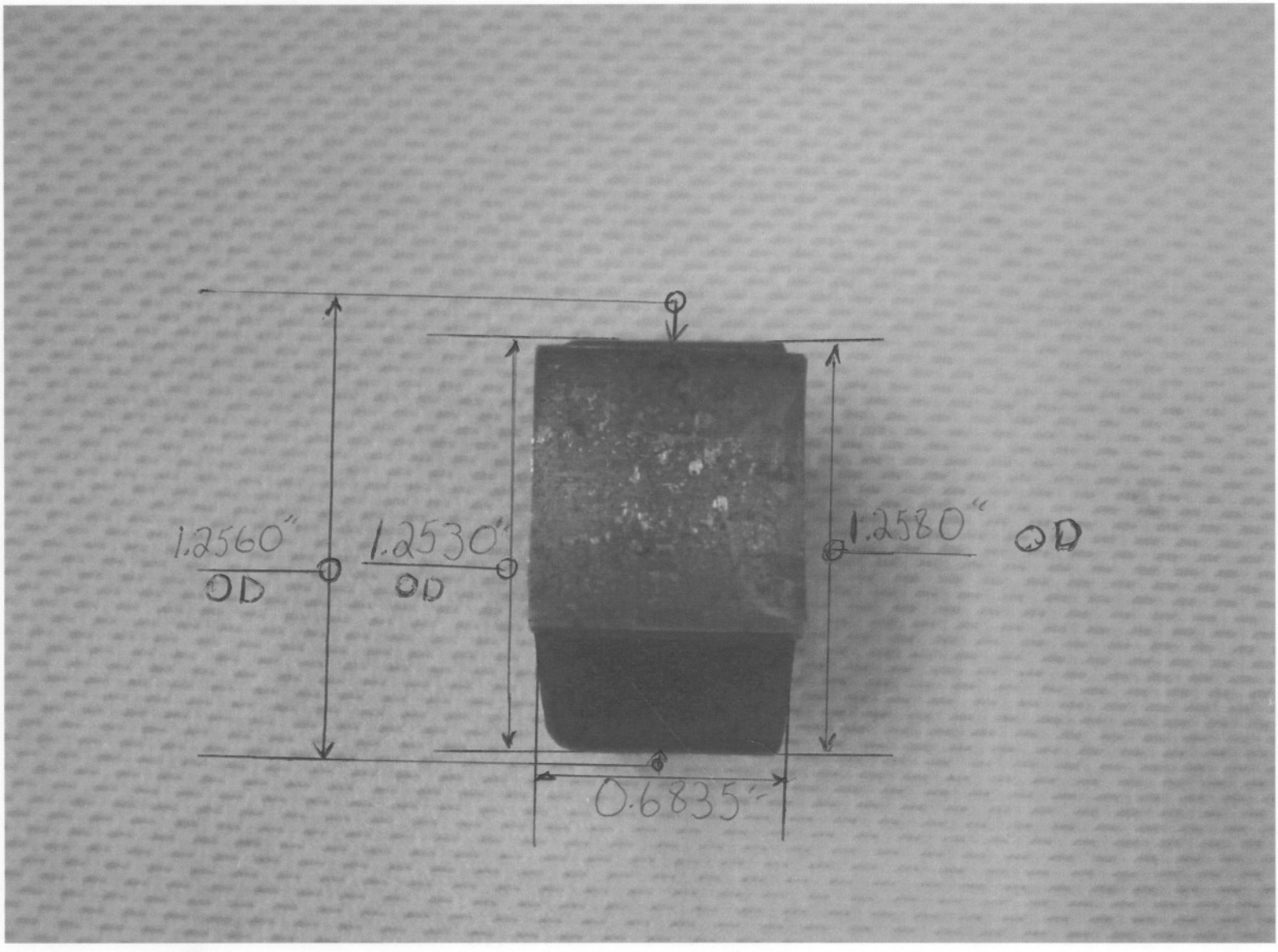


threaded cap

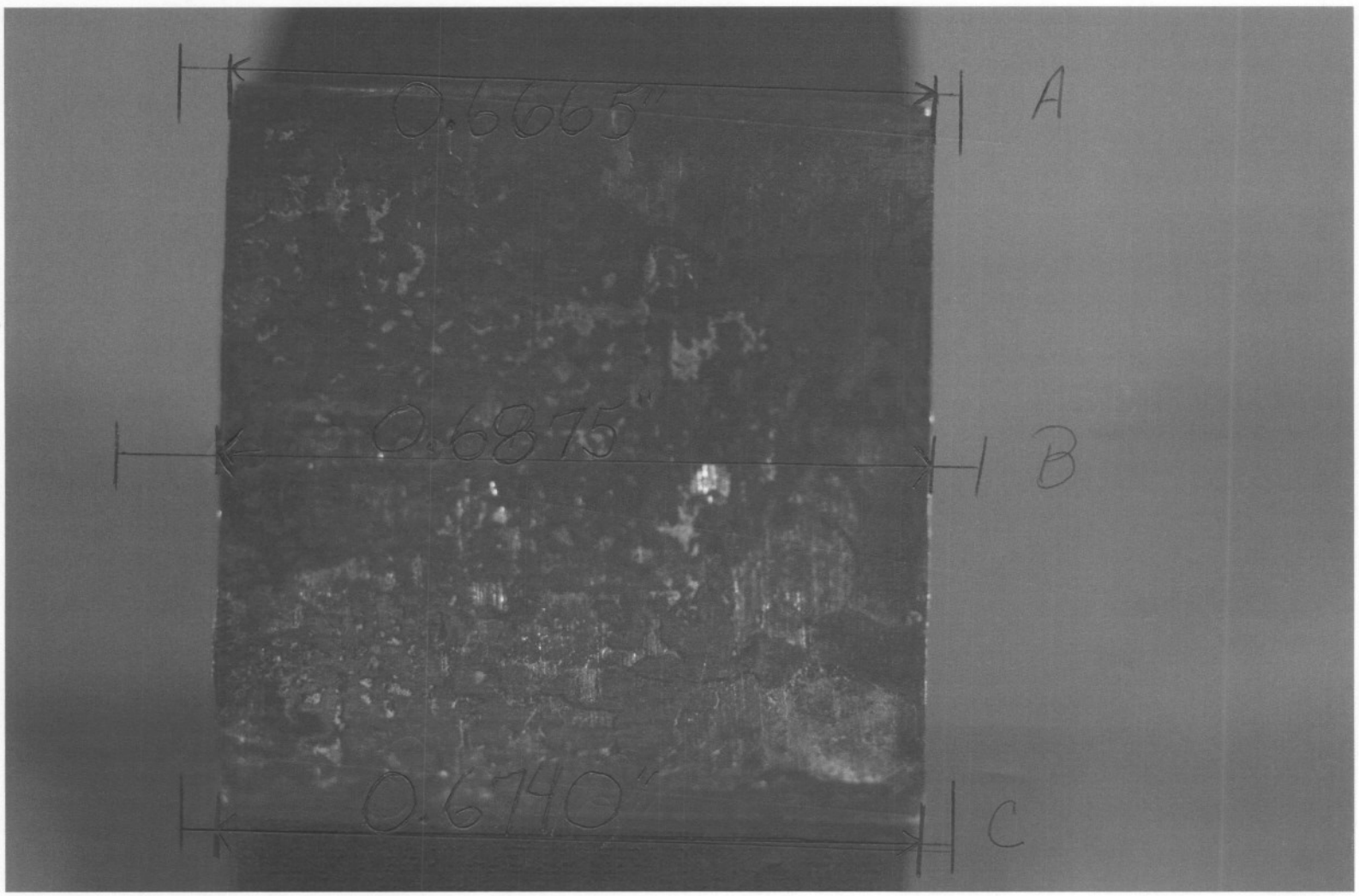
3 of 7



Barrel



Ring

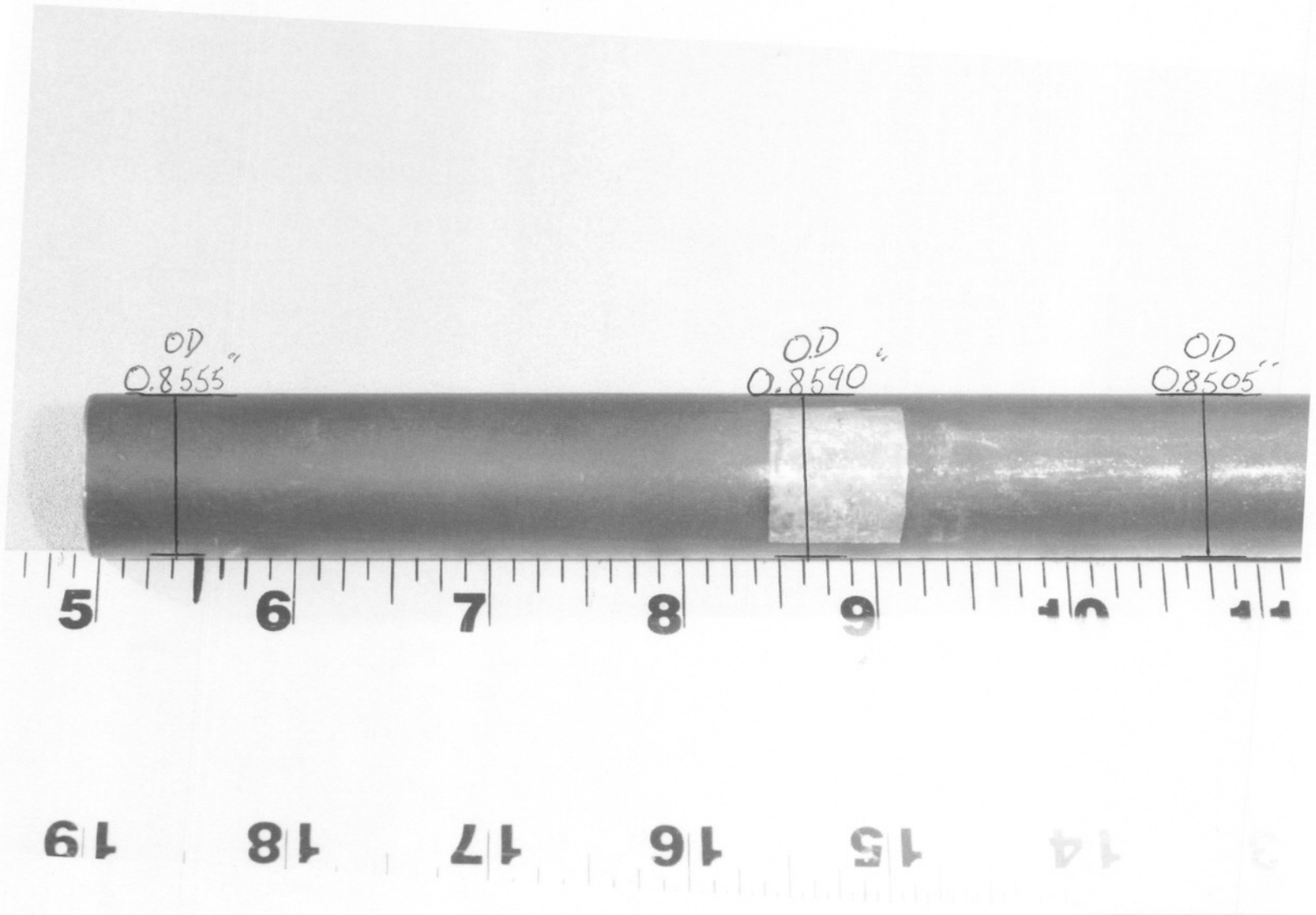


Measurement, A – 0.6665 –

Measurement, B – 0.6875 –

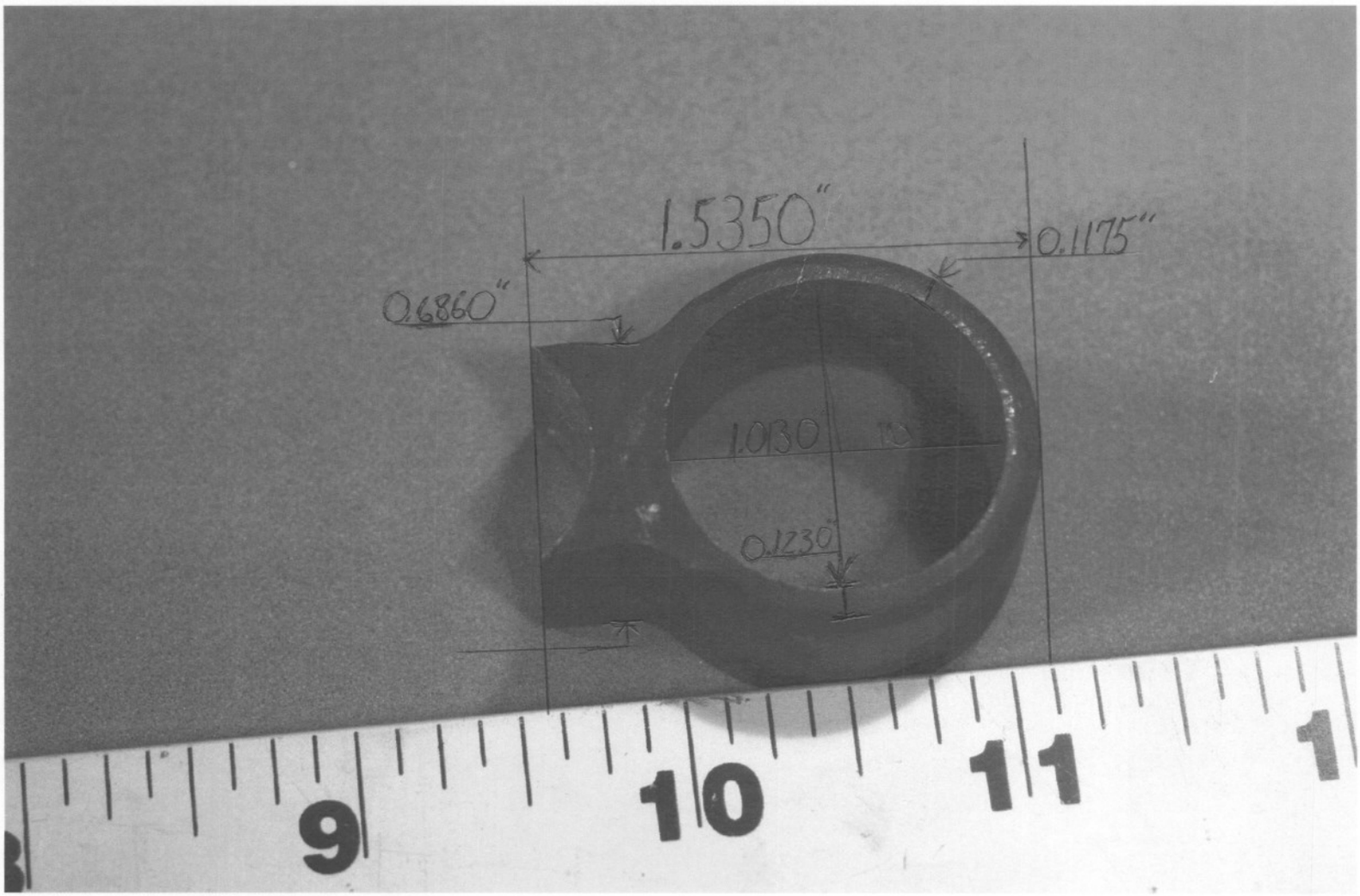
Measurement, C – 0.6740 –

Ring



Shotgun Barrel

7 of 7



Ring

ID = 1.0130"

Appendix D

***Brazing Handbook*. 4th Ed. American Welding Society: Miami, Florida. 1991. pgs. 70-71.**

Table 3.5
Chemical Composition Requirements for Copper, Copper-Zinc, and Copper-Phosphorus Filler Metals

AWS Classification	UNS Number[b]	Composition, weight percent[a] Cu	Ag	Zn	Sn	Fe	Mn	Ni	P	Pb	Al	Si	Other Elements Total[c]
BCu-1	C14180	99.90 min	—	—	—	—	—	—	0.075	0.02	0.01*	—	0.10
BCu-1a	—	99.90 min[d]	—	—	—	—	—	—	—	—	—	—	0.30[d]
BCu-2[e]	—	86.50 min	—	—	—	—	—	—	—	—	—	—	0.50
RBCuZn-A[f]	C47000	57.0-61.0	—	Remainder	0.25-1.00	*	*	—	—	0.05*	0.01*	*	0.50[f]
RBCuZn-C[f]	C68100	56.0-60.0	—	Remainder	0.80-1.10	0.25-1.20	0.01-0.50	—	—	0.05*	0.01*	0.04-0.15	0.50[f]
RBCuZn-D[f]	C77300	46.0-50.0	—	Remainder	—	—	—	9.0-11.0	0.25	0.05*	0.01*	0.04-0.25	0.50[f]
BCuP-1	C55180	Remainder	—	—	—	—	—	—	4.8-5.2	—	—	—	0.15
BCuP-2	C55181	Remainder	—	—	—	—	—	—	7.0-7.5	—	—	—	0.15
BCuP-3	C55281	Remainder	4.8-5.2	—	—	—	—	—	5.8-6.2	—	—	—	0.15
BCuP-4	C55283	Remainder	5.8-6.2	—	—	—	—	—	7.0-7.5	—	—	—	0.15
BCuP-5	C55284	Remainder	14.5-15.5	—	—	—	—	—	4.8-5.2	—	—	—	0.15
BCuP-6	C55280	Remainder	1.8-2.2	—	—	—	—	—	6.8-7.2	—	—	—	0.15
BCuP-7	C55282	Remainder	4.8-5.2	—	—	—	—	—	6.5-7.0	—	—	—	0.15

a. Single values are maximum, unless noted.

b. SAE/ASTM Unified Numbering System for Metals and Alloys.

c. The filler metal shall be analyzed for those specific elements for those values or asterisks* shown in this Table. If the presence of other elements is indicated in the course of this work, the amount of those elements shall be determined to ensure that their total does not exceed the limit specified.

d. The balance is oxygen, present as cuprous oxide.

e. These chemical composition requirements pertain only to the cuprous oxide powder and do not include requirements for the organic vehicle in which the cuprous oxide is suspended, when applied in paste form.

f. The total of all other elements including those for which a maximum value or asterisk* are shown, shall not exceed the value specified in "Other Elements, Total".

Table 3.6
Chemical Composition Requirements for Silver Filler Metals

AWS Classification	UNS Number[a]	Composition, Weight Percent Ag	Cu	Zn	Cd	Ni	Sn	Li	Mn	Other Elements, Total[b]
BAg-1	P07450	44.0-46.0	14.0-16.0	14.0-18.0	23.0-25.0	—	—	—	—	0.15
BAg-1a	P07500	49.0-51.0	14.5-16.5	14.5-18.5	17.0-19.0	—	—	—	—	0.15
BAg-2	P07350	34.0-36.0	25.0-27.0	19.0-23.0	17.0-19.0	—	—	—	—	0.15
BAg-2a	P07300	29.0-31.0	26.0-28.0	21.0-25.0	19.0-21.0	—	—	—	—	0.15
BAg-3	P07501	49.0-51.0	14.5-16.5	13.5-17.5	15.0-17.0	2.5-3.5	—	—	—	0.15
BAg-4	P07400	39.0-41.0	29.0-31.0	26.0-30.0	—	1.5-2.5	—	—	—	0.15
BAg-5	P07453	44.0-46.0	29.0-31.0	23.0-27.0	—	—	—	—	—	0.15
BAg-6	P07503	49.0-51.0	33.0-35.0	14.0-18.0	—	—	—	—	—	0.15
BAg-7	P07563	55.0-57.0	21.0-23.0	15.0-19.0	—	—	—	—	—	0.15
BAg-8	P07720	71.0-73.0	Remainder	—	—	—	4.5-5.5	—	—	0.15
BAg-8a	P07723	71.0-73.0	Remainder	—	—	—	—	—	—	0.15
BAg-9	P07650	64.0-66.0	19.0-21.0	13.0-17.0	—	—	—	0.25-0.50	—	0.15
BAg-10	P07700	69.0-71.0	19.0-21.0	8.0-12.0	—	—	—	—	—	0.15
BAg-13	P07540	53.0-55.0	Remainder	4.0-6.0	—	0.5-1.5	—	—	0.15	
BAg-13a	P07560	55.0-57.0	Remainder	—	—	1.5-2.5	—	—	—	0.15
BAg-18	P07600	59.0-61.0	Remainder	—	—	—	9.5-10.5	—	—	0.15
BAg-19	P07925	92.0-93.0	Remainder	—	—	—	—	0.15-0.30	—	0.15
BAg-20	P07301	29.0-31.0	37.0-39.0	30.0-34.0	—	—	—	—	—	0.15
BAg-21	P07630	62.0-64.0	27.5-29.5	—	—	2.0-3.0	5.0-7.0	—	—	0.15
BAg-22	P07490	48.0-50.0	15.0-17.0	21.0-25.0	—	4.0-5.0	—	—	7.0-8.0	0.15
BAg-23	P07850	84.0-86.0	—	—	—	—	—	—	Remainder	0.15
BAg-24	P07505	49.0-51.0	19.0-21.0	26.0-30.0	—	1.5-2.5	—	—	—	0.15
BAg-26	P07250	24.0-26.0	37.0-39.0	31.0-35.0	—	1.5-2.5	—	—	1.5-2.5	0.15
BAg-27	P07251	24.0-26.0	34.0-36.0	24.5-28.5	12.5-14.5	—	—	—	—	0.15
BAg-28	P07401	39.0-41.0	29.0-31.0	26.0-30.0	—	—	1.5-2.5	—	—	0.15
BAg-33	P07252	24.0-26.0	29.0-31.0	26.5-28.5	16.5-18.5	—	—	—	—	0.15
BAg-34	P07380	37.0-39.0	31.0-33.0	26.0-30.0	—	—	1.5-2.5	—	—	0.15

a. SAE/ASTM Unified Numbering System for Metals and Alloys.

b. The brazing filler metal shall be analyzed for those specific elements for which values are shown in this table. If the presence of other elements is indicated in the course of this work, the amount of those elements shall be determined to ensure that their total does not exceed the limit specified.

Raymond G. Thompson

Qualifications

Relevant Experience of Dr. Thompson:

Dr. Thompson is qualified by education in engineering design, engineering mechanics, failure analysis, materials specifications, materials analysis and materials testing. He received a BSE in engineering in 1974 and a MSE in materials engineering in 1975 from the University of Alabama in Birmingham. He received a Ph.D. in materials science and engineering from Vanderbilt University in 1979.

Dr. Thompson is a registered engineer in Alabama, Arkansas and South Carolina and is a Fellow and a member in good standing with the American Society of Materials and the American Welding Society.

Dr. Thompson taught in the Ceramics Engineering Department at Clemson University from 1978 – 1981 and taught at UAB in the Department of Materials Engineering from 1981 – 2002. While in these positions he taught undergraduate and graduate level courses in engineering design, fracture mechanics, strength of materials, materials testing, and manufacturing practice. He also conducts award winning research in metal science and metal processing and has led various national and international committees in these areas.

In Dr. Thompson's private professional practice, he has acted as a consultant for industry in the selection and use of metals, the fabrication of products and the processing of materials. Dr. Thompson continues to be active in research through contracts with the Department of Defense and the National Science Foundation. He participates in national committees in engineering and reviews articles for technical publications in science and engineering. He has also served both plaintiff and defense lawyers as an expert in matters of engineering design, failure analysis and manufacturing methods.

Technical Resume

President: **Vista Engineering, Inc. (1998 – present)**

Contact Information:

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Work Phone 205-943-6720
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Education:

B.S.E., University of Alabama at Birmingham (UAB), Materials Engineering, 1974.

M.S.E., UAB, Materials Engineering, 1975.

Ph.D., Vanderbilt University, Materials Science and Engineering, 1979.

Professional Experience:

President Vista Engineering, Inc. February 1998 to present.

President and CEO MontEagle Corp. September 1996 to February 1998.

Research Professor of Materials Science & Engineering, UAB, Birmingham, Alabama, 1997– 2002.

Tenured Professor of Materials Science & Engineering, UAB, Birmingham, Alabama, 1989 –1997.

Visiting Scientist, Royal Institute of Technology, Stockholm, Sweden, 1996 - 1996.

Tenured Associate Professor of Materials Engineering, UAB, Birmingham, Alabama, 1985 - 1988.

Associate Research Professor, Department of Metallurgy and Materials Engineering, Colorado School of Mines; Golden, Colorado, January 1989 - June, 1989.

Assistant Professor of Materials Engineering, UAB, Birmingham, Alabama, 1981 - 1985.

Assistant Professor of Materials Engineering, Clemson University, Clemson, South Carolina, 1978 - 1981.

UAB Appointments:

Director of Materials Research, Experimental Program to Stimulate Competitive Research, 1986 – 1997. (Participants: Auburn Univ., Univ. of Alabama, UAB, Univ. of Alabama Huntsville, Alabama A&M).

Graduate Program Director, Department of Materials Science and Engineering, 1991 - 93.

Campus Director of the Materials Science Ph.D. Program, UAB, 1991 - 93.

Membership in Professional Societies:

American Society for Materials, 1975-Present.
American Welding Society, 1980-Present.
The Metallurgical Society-AIME, 1975-Present.
American Society for Engineering Education
American Ceramic Society
Materials Research Society

Professional Registration:

Registered Professional Engineer, State of Alabama #15061
Registered Professional Engineer, State of Arkansas #12079
Licensed Professional Engineer, State of South Carolina #23965

Participation in Technical Committees:

Failure Analysis Committee, Member, ASM International, 2003 - Present
Alloy Phase Diagram Committee, Co-Chair, ASM International, 2001 – 2003.
Alloy Phase Diagram Committee, Member, ASM International, 1998 - Present
Joining Division Council (ASM), Metals and Ceramics Committee, Vice-Chairman, 1985-87.
Welding Research Council, Chairman High Alloys subcommittee, 1985-7
Welding Research Council, Vice-chairman High Alloys Subcommittee, 1984
Welding Research Council, Member High Alloys Subcommittee, 1984 - 1990
Technical Referee, Metallurgical Transactions.
Technical Referee, Welding Journal Research Suppl.
Technical Referee, Acta. Materials
Editorial Board of Science and Technology of Welding and Joining.

Service:

Chairman, Birmingham Section of American Society for Materials (ASM), 2000
ASM International Nominating Committee, 2001
Symposium Organizer – Joining and Repair of Gas Turbine Engines II, ASM International, 2002.
Symposium Organizer – Joining and Repair of Gas Turbine Engines II, ASM International, 1999.
Symposium Committee – Alloy 718, TMS, 1988.
Symposium Committee – Alloy 718, 625 and Derivatives, TMS, 1991.
Symposium Committee – Alloy 718, 625, 706 and Derivatives, TMS, 1994.
Symposium Committee – Alloy 718, 625, 706 and Derivatives, TMS, 1997.
Technical Referee, Metallurgical Transactions
Technical Referee, U.S. Civilian Research and Development Foundation

Reviewer, National Science Foundation

Navy Welding Technology Evaluation Team to India, 1987

China Invitation Speaker by Metals Society of China, 1986, 1992

US – China Superalloys Speakers in China, 1998

Patents:

The first patent identified has been in use for 10 years by Southwire Corp. in the production of electrical conductor cable for overhead trolley cars and light trains. The patent allows conductor cable to be cut, brazed and spliced together while on a continuous drawing mill.

Patent # 5215246, Thompson et. al., "Method and Apparatus for Brazing", June 1, 1993.

Patent Applied For, 2003, Thompson et. al., "Application of modulated wave packets for eddy current inspection".

Awards and Honors:

Engineering Council of Birmingham, Nomination for Engineer of the Year, 2007

Fellow, American Welding Society (AWS), 2005

Fellow, American Society of Materials (ASM International), 2004.

ASM established the honor of Fellow of the Society to provide recognition of members for distinguished contributions in the field of materials science and engineering and to develop a forum for technical and professional leaders to serve as advisors to the Society.

Savage Award, by the American Welding Society, 1995.

V. L. Acoff, R. G. Thompson, R. D. Griffin and B. Radhakrishnan, "Effect of Postweld Heat Treatment on Ti-14%Al-21%Nb Fusion Zone Structure and Hardness," Welding Journal Research Suppl., 74, 1995, 1s - 9s.

This is the award given by AWS for the outstanding publication in the Welding Journal (refereed) for 1995.

Adams Award, by the American Welding Society, 1985.

This is an annual award given to the university educator who demonstrated outstanding service in teaching and research related to welding metallurgy and processing.

Outstanding Publication, Vanderbilt School of Engineering, 1981.

Alpha Sigma Mu, Materials Engineering Honor Society, 1977.

Graduate Engineering Student of the Year, University of Alabama in Birmingham, 1974.

Engineering Student of the Year, University of Alabama in Birmingham, 1973.

Tau Beta Phi, Engineering Honor Society, 1973.

NASA Technology Awards

New Technology Award NASA 1983 (new methods for studying microfissuring in alloy 718)

New Technology Award NASA 1982 (new methods for studying microfissuring in alloy 718)

Competitively Awarded Grants (since 1990):

National Science Foundation – SBIR Phase II & IIB, "Nanocrystalline Diamond Coated Cutting Tools", 2003-06, $1,100,000.

National Science Foundation – SBIR Phase I, "Nanocrystalline Diamond Coated Cutting Tools", 2003, $100,000.

Dept. of Defense, Metals Affordability Initiative, Cooperative Agreement Project: RRA-3, Microstructure Modeling and Ingot Grain Refinement for Turbine Disks, 2001 – 2002, $150,000.

National Science Foundation - SBIR, "Interface Design for Diamond-Coated Steel", 2001, $100,000.

National Science Foundation, DMR-8807915, 9112251, 9417326, "Microstructural Evolution During Materials Processing," 1988-1998, $1,115,109.

NSF-EPSCoR I, II, III, "A State Plan for Improving Materials Science and Engineering Research in Alabama," 1986-1998, $12,095,871.

NSF, "Acquisition of a Vacuum Melting System," NSF-DMR-9207816, 1992-1993, $132,500.

Department of Energy (Basic Energy Sciences), "Migration of Constitutionally Liquated Films," 1991-1995, $225,324. (with B. Radhakrishnan).

Other Grants and Contracts as P.I. (since 1990):

DOE, "Intergranular Stress Corrosion Cracking of Stainless Steel", 1996, 2000, 2001. $75,000.

CCT Inc., SBIR – Phase 2, "Monte Carlo Simulation of Microstructures," 1997-1999, $290,000.

Pratt and Whitney Corp., "Computational Thermodynamics," 1996, $10,000.

INCO Corp., "Alloy Development through Computational Thermodynamics," 1996-1998, $20,000.

CCT Inc., SBIR – Phase 1, "Monte Carlo Simulation of Microstructures," 1995-1996, $85,000.

DOE-Howmet "Advanced Alloy 718 Castings," 1992-1994, $102,000.

Rockwell International, "Advanced Alloy Casting," 1992-1994, $71,540.

Cray, "Microstructural Modeling," 1992-1993, $21,500.

NASA, "Effect of Boron on Intergranular Hot Cracking in Ni-Cr-Fe Alloys," 1989-1990, $51,569.

Books:

Joining and Repair of Gas Turbine Engines, Ed. Donald Tillack and Raymond Thompson, ASM, 1998.

Publications:

Papers Published In Refereed Journals

"The Influence of Sulfur on Stress-Rupture Fracture in INCONEL 718 Superalloys", J.X. Dong, X.S. Xie, and R.G. Thompson, Met Trans, 31A., 2000, 2135-2144.

"Interfacial Adhesion And Toughness Of Nano-Structured Diamond Coatings", Neeta Toprani, Shane Catledge, Raymond Thompson, and Yogesh K. Vohra, J. of Materials Research, 15, 2000, pp. 1052.

"Segregation Of Sulfur And Phosphorus In Nickel-Base Alloy 718", Dong, J.X., Liu, X.B., Xie, X.S, Thompson, R.G, Acta Metallurgica Sinica (English Letters), v 10, n 6, 1997, pp 510-514.

"Computer Simulation of Grain Growth with Second Phase Particle Pinning," J. Gao, R.G. Thompson, and B.R. Patterson, Acta mater., Vol. 45, Issue 9, 1997, pp. 3653-3658.

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Papers Published In Conference Proceedings (since 1990)

"Microstructure Analysis and Modeling of Ingot to Billet Conversion in Alloy 718", R. G. Thompson, G. M. Janowski, W. D. Carden, J. M. Papo and H. Ning, Materials Science Forum, Vols. 426-432 (2003) pp. 809 – 814, (THERMEC 2003 Conf., Madrid Spain).

"Nanocrystalline Diamond Coatings", R. Thompson, W. Carden, Y. Vohra, M. Koopman, Surface Engineering Coatings and Heat Treatments (ASM International, 13th IFHTSE Congress, 2002, Columbus Ohio), ASM International Publisher. ISBN 0-87170-781-0.

"Business – Engineering Curriculum Experiment Produces Results", R. G. Thompson, M. M. Gee, A. Eberhardt, L. K. Vogle, and G. M. Edwards, 2001 ASEE Annual Conference Proceedings, Albuquerque, NM.

"The Influence of Sulfur on Stress-Rupture Fracture in INCONEL 718 Superalloys", J.X. Dong, X.S. Xie, and R.G. Thompson, Met Trans, 31A., 2000, 2135-2144

"A DICTRA Simulation of θ - phase Dissolution in Al-Cu Alloys", Raymond G. Thompson and Curt Malam, Materials Research Society Symposium - Proceedings Nucleation and Growth Processes in Materials, v580, 2000, Boston, MA.

"Segregation Behavior of Phosphorous and its Effect on Microstructure and Mechanical Properties in Alloy System Ni-Cr-Fe-Mo-Nb-Ti-Al", X.S. Xie, J.X. Dong, R.G. Thompson, et. al., Superalloys 718, 625, 706 and Various Derivatives, ed. E.A. Loria, TMS, 1997, pp.531.

"Phase Formation Modeling of an Alloy 706 Casting Using Computational Thermodynamics", B.A. Boutwell, R.G. Thompson, N. Saunders, S.K. Mannan, and J.J. deBarbadillo, Superalloys 718, 625, 706 and Various Derivatives, ed. E.A. Loria, TMS, 1997, pp.99.

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"Analysis of Weld HAZ Hot Cracks in Al-Li Alloy 2195," R.G. Thompson, Light Alloys for Aerospace Applications III, TMS, Editors E. W. Lee, 1995.

"Constitutional Liquid Film Migration in the Weld HAZ of a Nickel Base Superalloy," V. L. Acoff and R.G. Thompson, Proceedings of 4th International Conference on Trends in Welding Research, ed. H. B. Smartt, J. A. Johnson, S. A. David, ASM, 1995, 241 – 246.

"Microstructural Analysis of Fine Grain Alloy 718 Castings," R.G. Thompson B. Boutwell, Superalloys 718, 625 and 706, Amer. Soc. For Materials, Pittsburgh, PA., June, 1994.

"Auger Study of Elemental Segregation to Hot-Crack Surfaces in Al-Li Welds," R.G. Thompson, Advanced Earth-to-Orbit Propulsion Technology Proceedings, NASA-MSFC, Huntsville Al., 1994.

"Characterization of Constitutional Liquid Film Migration in Alloy 718," V.L. Acoff, R. D. Griffin and R.G. Thompson, Annual Electron Microscopy Proceedings, New Orleans LA., 1994.

"Constitutional Liquid Film Migration," V.L. Acoff and R.G. Thompson, Solid-Solid Phase Transformations Proceeding, The Materials Society, Pittsburgh, PA., 1994.

"Monte Carlo Simulation of HAZ Grain Growth", R.G. Thompson and Y. Liu, International Conference on Modeling and Control of Joining Processes Proceedings, AWS, 1993.

"Grain Boundary and Interface Cohesion in the Presence of a Steep Hydrogen Gradient (A preliminary Auger-Fracture Study)", R.G. Thompson, B.H. King, M.C. Koopman and D.W. Davis, Advanced Earth-to-Orbit Propulsion Technology Proceedings, NASA-MSFC, 1992.

"Monte Carlo Simulation of Grain Growth in the HAZ", Y. Shen, B. Radhakrishnan and R.G. Thompson, Proceedings of the 3rd International Conference on Trends in Welding Research, Eds: S.A. David and J.M. Vitek, ASM, 1993, pp. 259-263.

"Modeling of Subsolidus Liquation in the Weld Heat Affected Zone", B. Radhakrishnan and R.G. Thompson, Proceedings of the 3rd International Conference on Trends in Welding Research, Eds: S.A. David and J.M. Vitek, ASM, 1993, pp. 321-326.

"Effect of Heat Treatment on Microstructure and Microhardness of Spot Welds in Ti-26Al-11Nb", High Temperature Aluminides and Intermetallics Proceedings, TMS, San Diego CA, 1991.

"Grain Boundary Chemistry of Alloy 718-Type Alloys," R. G. Thompson, M. C. Koopman and B. H. King, Superalloy 718, 625 and Derivatives, Editor: Ed Loria, TMS, 1991, pp. 53-70.

"Modeling of Microstructural Evolution in the Weld HAZ", B. Radhakrishnan and R. G. Thompson, Metal Science of Joining, Ed. M.J. Cieslak, et al., TMS, 1991, pp. 31-40.

"A Study of the Effects of Phosphorus, Sulfur, Boron and Carbon on Laves and Carbide Formation in Alloy 718," C. Chen, R. G. Thompson and D. W. Davis, Superalloys 718, 625 and Derivatives, Ed: Ed Loria, TMS, 1991, pp. 81-96.

"Interface Segregation in a Nickel Base Superalloy", M. C. Koopman and R. G. Thompson, Microbeam Analysis-1990, Eds. J. R. Michael and P. Ingram, San Francisco Press, Inc., 1990.

"Intergranular Liquation Effects on Weldability", R. G. Thompson, Weldability of Materials, ASM, 1990, pp. 57-63.

Presentations (Since 2000):

Dr. Thompson listing of presentations at national and international meetings was lost in 1999. He made his first national research presentation in 1975 at the Annual ASM-TMS Convention in Las Vegas, NV. Since that time an informal count has the number at well over 100. His invited international presentations include China (1986, 1993, 1998), India (1987), Greece (1991), Japan (1993), Sweden (1996), France (1996), Norway (1998), Spain (2003), and Israel (2003).

"Modeling Microstructure Evolution in Alloy 718 Ingot to Billet Conversion" W. C. Carden and R. G. Thompson, American Society for Materials, Annual Meeting, Pittsburgh PA, 2003.

"Fatigue Failure in a Threaded Eyebolt: A Case Study" W. C. Carden and R. G. Thompson, American Society for Materials, Annual Meeting, Pittsburgh PA, 2003.

"Spot Weld Failure in Galvanized Steel Sheets: A Case Study", R. G. Thompson and W. C. Carden, American Society for Materials, Annual Meeting, Pittsburgh PA, 2003.

"Failure Analysis of a Spot Weld and Eyebolt", R. G. Thompson and W. C. Carden, American Society for Materials, Birmingham, AL, 2003.

"Nanodiamond Coatings for Cutting Tools", R. G. Thompson, UAB Tech Day, Birmingham AL, 2003.

"Nanodiamond Coatings for Cutting Tools", R. G. Thompson, Birmingham Venture Club, Birmingham AL, 2003.

"Nanocrystalline Diamond Coatings", R. G. Thompson, W. C. Carden, Y. Vohra, M. Koopman, ASM International, 13th IFHTSE Congress, Columbus, OH, 2002.

"Nanodiamond Coatings for Cutting Tools", R. G. Thompson, BTG, Birmingham AL, 2002.

"Nanodiamond Coatings for Cutting Tools", R. G. Thompson, Emerging Technology Partners, Birmingham AL, 2002.

"Failure Analysis", R. G. Thompson, Soc. Women Engineers, Birmingham AL, 2002.

"Nanodiamond Coatings", R. G. Thompson and Y. Vohra, Kennametal Corp., Latrobe PA, 2001.

"Mitigation of Microfissuring", R. G. Thompson, Boeing Corp., Los Angeles CA, 2001.

"Basics of Process Metallurgy", American Society for Materials Educational Course, Birmingham Section of ASM, Organized by Dr. Raymond G. Thompson, Vista Engineering Inc, 2001.

"Critical Care Ground Safety - What You Should Know", L. L. Demmons, R. G. Thompson, Assoc. Air Medical Services, Salt lake City, UT, 2000.

"A DICTRA Simulation of θ - phase Dissolution in Al-Cu Alloys", Raymond G. Thompson and Curt Malam, Materials Research Society Symposium - Proceedings Nucleation and Growth Processes in Materials, v580, 2000, Boston, MA.

University Teaching:

Teaching

Dr. Thompson spent 24 years in teaching undergraduate and graduate Materials Engineering as an Assistant Professor of Engineering at Clemson University and a Professor of Engineering at UAB. During that period, he developed and taught courses in many aspects of metallurgy, ceramics, polymers, mechanical properties, processing, failure analysis and design. His graduate students work in industry and academia in the USA and abroad.

Teaching Welding Engineering

Dr. Thompson developed and taught courses in welding metallurgy, weld processing and nondestructive testing while at UAB. These courses were well attended at both the undergraduate and graduate levels. These courses were taught as advanced undergraduate and graduate electives in the Materials Engineering Department.

- Nondestructive Evaluation of Engineering Materials, 3 semester hrs
- Welding Processes, 3 semester hrs
- Welding Metallurgy, 3 semester hrs

Teaching Undergraduate

He taught in the Ceramic Engineering Department at Clemson from 1978 – 1981. While there he taught introductory materials engineering, failure analysis, and mechanical metallurgy. From 1981 – 2002, he taught in the Materials Engineering Department at the University of Alabama at Birmingham. Dr. Thompson was responsible for courses including:

- Introduction to Engineering
- Materials Engineering I
- Materials Engineering II
- Physical Metallurgy
- Fracture Mechanics and Failure Analysis
- Mechanical Behavior of Materials
- Materials Selection and Design
- Senior Design I
- Senior Design II

Dr. Thompson was responsible for developing and teaching the capstone senior design sequence for both the Materials Engineering and Mechanical Engineering Departments. As part of this undergraduate teaching effort, he was responsible for the following awards:

- Sterne Library Grant to establish an engineering design collection. The award was used to purchase approximately 100 leading texts on engineering design related to materials selection and engineering mechanics. (with Dr. A. Eberhardt, $5,000)
- Grant to establish the Materials and Mechanical Engineering Senior Design Lab. This grant was used to equip a laboratory for the development of senior design projects from conception through prototype production. (with Dr. A. Eberhardt, $35,000)
- National Science Foundation Grant: Designs for the Disabled. (Dr. A. Eberhardt, PI) This grant was a continuing grant to support the design from conception to prototype production of devices to assist disabled persons. The designs were most often done in conjunction with the United Cerebral Palsy of Birmingham in support of their facilities for childcare and adult homes. ($20,000 per year)
- National Collegiate Inventors and Innovators Alliance grant for collaborative design in education (with Drs. Eberhardt and Gee). This grant supported collaboration between the Engineering Scholl senior design course and the Business School entrepreneurship course. Student teams from these two courses jointly produced a business plan and prototype for capstone design projects. ($45,000)

Teaching Graduate

He developed and taught the following courses at the Graduate level:

- Advanced Mechanical Metallurgy
- Physical Metallurgy
- Fracture Mechanics
- Structures and Properties of Surfaces and Interfaces
- Computational Thermodynamics of Materials
- Diffusional Phase Transformations
-

As a member of the Graduate School faculty, Dr. Thompson served as Graduate Program Director for the Department of Materials Engineering. He also served as Director of UAB's interdisciplinary Materials Science Ph D program for Materials Engineering, Biomedical Engineering, Physics, Chemistry, and Biochemistry.

He served as graduate advisor on 18 Master and Ph. D. committees and sat as a committee member for numerous other student research theses and dissertations at Clemson Univ., UAB, Univ. of Alabama, UAH, Royal Institute of Technology Stockholm, Sweden, and Norwegian Technical University in Trondhiem, Norway.

Theses and Dissertations Directed:

"Nucleation in a Ni-Based Superalloy Utilizing Computational Thermodynamics and Diffusional Kinetics," B. Boutwell, Ph.D. Dissertation, UAB, 1999.

"Computer Simulation of Grain Growth in the HAZ," J. Gao, Ph.D. Dissertation, 1997.

"Liquid Film Migration," Hongjun (Aaron)Zuo, Ph.D. Dissertation, UAB, 1996.

"Constitutional Liquid Film Migration," V. Acoff, Ph.D. Dissertation, UAB, 1994.

"The Role of Impurity Content on Carbide Shape, Size and Distribution," M. Koopman, Masters Thesis, UAB, 1994.

"Monte Carlo Simulation of Grain Growth," Y. Shen, Masters Thesis, UAB, 1994.

"Post Weld Heat Treatment of Titanium Aluminide," V. Acoff, Masters Thesis, UAB, 1991.

"Continuous Cooling Transformation in the Heat Affected Zone of 1040 Steel," J. R. Dobbs, Masters Thesis, UAB, 1991.

"Effects of Carbon and Boron on Solidification of 718 Type Nickel Alloys," Chungeng Chen, Masters Thesis, UAB, 1991.

"Interfacial Sulfur Segregation in Nickel Superalloy 718," Dolores W. Davis, Masters Thesis, UAB, 1990.

"The Effect of Intergranular Liquid Distribution on Hot Cracking Susceptibility of Alloy 718," B. Radhakrishnan, Ph.D. Dissertation, UAB, 1989.

"Stability of Cu Thin Films on Porous and Nonporous Cordierite Substrates," J. C. Poret, Masters Thesis, UAB, 1989.

"The Effect of Intergranular Precipitates on Grain Growth in Nickel Alloy 718," G. Muralidharan, Masters Thesis, UAB, 1988.

"Dielectric Constant Behavior in the Cordierite-Glass-Pore System," C. J. Shyu, Masters Thesis, UAB, 1988.

"Effect of Intergranular Cracks on the Fatigue Behavior of Alloy 718," E. L. Bradley, III, Masters Thesis, UAB, 1988.

"The Effect of Electromagnetic Stirring on the Microstructure of Continuous Cast Steel," Ji-Yu Hong, Masters Thesis, UAB, 1987.

"The Effects of Sulfur and Carbon on the Microfissuring Susceptibility of Cast Nickel Alloy 718," D. E. Mayo, Masters Thesis, UAB, 1987.

"A Correlation of Microstructure with Hot-Ductility in the Heat-Affected Zone of Inconel 718," Semih Genculu, Masters Thesis, UAB, 1982.

Experimental Program to Stimulate Competitive Research – EPSCoR:

Dr. Thompson's definitive contribution to graduate education and program development came through his management in the Alabama EPSCoR Program. EPSCoR started as an NSF initiative to improve research skills in states historically under funded by federal research grants. Alabama became eligible for the program in 1985. Dr. Thompson led a proposal for EPSCoR support of materials research. The Alabama proposal, led by Biochemist Dr. Ken Pruitt with materials research as the lead component, received the highest rating and was funded in a hotly contested NSF competition. The materials research component became known as the Alabama EPSCoR Materials Research Program. It eventually came to include seven universities; University of Alabama, Auburn University, University of Alabama at Birmingham (UAB), University of Alabama at Huntsville (UAH), Alabama A&M University, Tuskegee University and University

of South Alabama. Dr. Thompson was chosen to lead the program and he directed it for 10 years. This program was especially important to welding education and research at UAB (Thompson) and Auburn University (Chin, Fergus, Gale).

Faculty Development

Alabama EPSCoR supported the development over 100 faculty in the area of materials research during the period 1987 – 1999. During this same period, participating faculty supported over 200 graduate students. The yearly average number of refereed publications per faculty more than doubled. The average number of research proposals per faculty tripled. The funded research in materials went from under $1M per year to over $10M per year. The number of faculty participating in materials engineering research more than tripled during the program.

Program Development

At the beginning of the Alabama EPSCoR Materials Research program in 1985 there were no Materials PhD programs in the state. By 1990, Alabama had PhD programs in Materials Engineering at Alabama, Auburn, and the University of Alabama at Birmingham. The state also had Materials Science PhD programs at Alabama, the University of Alabama at Birmingham, and the University of Alabama at Huntsville. The state also saw emphasis in materials research at departments of physics, chemistry, biochemistry and bioengineering. These programs remain healthy today, turning out exciting research and productive graduate students.

The Alabama EPSCoR Materials Research program was also responsible for funding or supporting a host of laboratory and instrumentation acquisitions. Materials research equipment expenditures exceeded $5M in the first 5 years of the program.

The later years of the program saw the development of several Multi-campus Materials Research Centers including Composites, Biomedical Surfaces, and Smart Materials.

Industrial Consulting/Research:

3D, LLC – Birmingham, AL
Amerex - Trussville, AL
Alabama Power – Birmingham, AL
American Testing – Bessemer, AL
Beck Sales and Manufacturing - Helena, AL
Birmingham Rail – Birmingham, AL
Birmingham Steel - Birmingham AL
Blazon Tube – Westpoint, MS
Carr Associates - Birmingham AL
CCT Inc. – Columbus OH
Coilplus – Jackson, MS
Coilplus – Athens, AL
Davis Dumas - Birmingham AL
Department of Energy -Washington DC

DePuy Inc. - Warsaw, IN
DOE-Howmet – Norfolk VA
Durect – Pelham, AL
Energetics Technologies – Omer, Israel
Energy Absorption – Pell City, AL
EPRI, - Charlotte N.C
Flexible Flyer - West Point, MS
FMC - Tupelo MS
Fontaine Fifth Wheel - Birmingham, AL
General Electric - Gas Turbine Division, Evandale, OH
General Electric Corporate Research - Schenectady, NY
Georgia Power - Forest Park, GA
Goodrich Turbine Technology - West Des Moines, IA
GTG Corp. - Lacey's Spring, AL
Gulf States Steel – Birmingham AL, Chicago, IL
Hobart Brothers - Troy OH
INCO Corp. Huntington WV
Industrial Recon - Birmingham, AL
Jeffery Manufacturing - Belton, SC
Maytag Co. – Arkansas
Metro Welding - Birmingham AL
NASA, MSFC – Huntsville AL
National Science Foundation - Washington DC
Newmark – Birmingham, AL
Nortrac - Birmingham AL
Ogihara – Birmingham, AL
O'Neal Steel – Birmingham, AL
Pratt Whitney Corp.
PSI – Irondale, AL
Southern Filters, Inc. - Birmingham, AL
Rockwell International - Rocketdyne Division - Los Angeles CA
Roger Tool Works - Roger, AR
Rolls Royce – Indianapolis IN
Saginaw Pipe - Saginaw, AL
Sherman Industries - Birmingham, AL
Smith Int. - Houston TX
Southwire Company - Carrollton, GA
Steris Corporation – Montgomery, AL
Stress Lab, Inc., - Birmingham, AL
Surgical Pack Services, Inc. - Birmingham, AL
TEMCO Metals - Birmingham, AL
Thompson Fabricating - Birmingham, AL
Trimark, Inc., - Piqua, OH
Trussville Utilities – Trussville, AL
TRW - Drill Division, Clemson, SC
Tuscaloosa Steel - Tuscaloosa AL

United Chair - Birmingham, AL
US Pipe – Birmingham, AL
US Steel - Birmingham AL
Whitesell Corporation - Muscle Shoals, AL
Wise Alloys - Muscle Shoals, AL